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# The influence of intervention style, information, and social context on the persistence of newly introduced behavior in planned change contexts.

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Principal Investigator

Georgia Institute of Technology
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December, 1979

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Summary

The literature on planned change in organizations is notable for a lack of attention to the perseverence of new behavior over time or to processes and procedures which may contribute to institutionalizing new behaviors in organizations. It is possible to reduce nearly all planned change efforts to the production of persistent new behavior, hence the problem of institutionalizing behavior is central to the success of change efforts. This study attempted to investigate several factors which may be important for producing persistence.

A 2 x 3 x 3 factorial design was used to systematically vary the participativeness of intervention style, the positivity of group performance feedback and the positivity of individual performance feedback pattern to three person teams engaged in playing a management simulation game.

A situation of planned organizational change, at a group level, was experimentally simulated by having 100 three-person groups play a management simulation game in which there were differentiable tasks and meaningful group and individual performance indicators. The groups were provided with an opportunity to play the game for ten trials. At that point, a new behavior was introduced, job rotation, which formed the basis for the manipulation of three independent variables in a 2 x 3 x 3 + 2 factorial design.

The independent variables were the amount of participation subjects were permitted in the intervention (i.e., intervention style), group performance feedback following the intervention and individual performance feedback following the intervention. Both types of performance feedback were manipulated to be either positive, indicating performance improvement over pre-intervention levels, or negative indicating no improvement.

The dependent variables were actual rotation behavior, behavioral intention to rotate, group and individual performance outcome valences and the group process measures of cohesiveness and social influence.

A variety of main and interactive effects were hypothesized. There were several major findings. First, the behavioral intention variable exhibited main effects from the style and feedback variables such that intention to rotate was increased by participation and positive group or individual feedback. A second finding was an interaction between style and feedback such that under certain conditions, style interacted with feedback to enhance persistence. Specifically, the combination of participation and group feedback created a stronger propensity to rotate. It was also found that group feedback, alone, was very effective in promoting persistence. Additional effects were demonstrated for the valence and process variables.

The results have several implications for the design of planned change technologies. Most importantly, it is indicated that the information available following an intervention should be matched to the type of intervention, the task and the social melieu.

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In a laboratory simulation of a planned change context, the participativeness of intervention style, positivity or negativity of group feedback and positivity or negativity of individual feedback on performance were varied in a factorial experimental design. The dependent variables were performance of a new behavior, valence of key outcomes and the social process indicators of cohesiveness and influence. Significant main and interactive effects were hypothesized and empirically investigated. The results suggest a variety of implications for the design and implementation of organizational change.

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# I. Introduction

The growing concern for the productivity and quality of working life is evidenced by a marked increase in the funding and production of research on improving these factors (Suttle, 1977). This endeavor has increased the need for a thorough understanding of the factors and processes which influence the durability of planned change efforts. This research was addressed to a portion of this problem; that is, an examination of several factors which may by themselves and/or interactively affect the persistence of organizational changes.

The present research adopted the perspective that successful organizational change, at its basis, requires a change in behavior at the level of individuals. This view is consistent with typologies of change that segment interventions by level of inclusion, such as the Human Relation versus Technostructural division suggested by Friedlander and Brown (1974), it simply reduces all change to the level of individual action. Specifically, it was assumed that organizational change always involves, to some degree, changes in individual behavior. The author, in a prior study (Conlon, in press), suggested a model in which the adoption and persistence of a newly introduced behavior resulted from a series of decisions, first about adoption, and then about persistence (see Figure I-1). Persistence decisions could be triggered by a variety of factors, and persistence would result from the continued dominance of the previously chosen alternative over other alternatives in terms of the value of the

outcomes occuring from the behavior.

This particular perspective on change originates mainly from the author's observations of a planned change effort in a Pennsylvania coal mine which are detailed in his dissertation (Conlon, 1977) and elsewhere (Goodman, 1979). The intervention in the mine used a socio- technical perspective on organization; that is, productivity would be maximized when a fit existed between the technology and the socio- cultural melieu. Often, the intervention introducing new work behaviors into the mine such as job rotation, on the job planning sessions at which work crews would discuss the day's work and institutionalized communications between work shifts. All of these behaviors were necessitated by the demands of the mining technology and were expected, by the interveners and the workers, to enhance valued outcomes (e.g., pay, production, safety, etc.). Generally, these behaviors were adopted by the work crews, but not all of them persisted over time. The reasons for rejecting adopted behaviors were many and varied, but they fell into three categories. In one class, adoption occured based on the expectation that valued outcomes would accrue from performance, but these outcomes failed to materialize (i.e., contradictions). In a second case, unexpected outcomes, such as interpersonal ridicule, occured as a result of adoption (i.e., unexpected outcomes). Finally, new and better behavioral alternatives arose consequent to adoption, hence these alternatives were subsequently adopted (i.e., new alternatives).

The particular model underlying this research, then, was of the individual participants as decision makers who made choices about adoption and persistence of behaviors that were prescribed by a change agent. An heuristic representation of the decision, and its outcome, is offered by expectancy theory (Mitchell, 1974; Vroom, 1964). Specifically, choices among behavioral alternatives are based on expectations that valued outcomes will result from performance of the alternative behaviors, and choices are made to maximize the "expected value" of the behavior. Hence, newly adopted behaviors will persist as long as the value associated the behavior dominates the behavioral alternatives.

## Extant Literature

It is rational and traditional when one proposes a model, to search the existing literature for evidence to either confirm or disconfirm it. In the present case, the literature was reviewed and found to be lacking in its ability to validate the model. Most investigations of persistence of planned change are either case studies or repeated measure surveys. The case studies (e.g., Trist, Higgen, Murray and Pollack, 1963; Rice, 1958) have the advantage of rich description, but generally lack the attention to measurement necessary for model validation or generalization across situations. The repeated measures surveys provide more methodological rigor, but have generally ignored specific behaviors. Such studies have examined the effects of planned change on the persistence of organizational climate (Golembiewski

and Carrigan, 1970 a & b; Golembiewski and Munzenrider, 1973) or general effectiveness indicators such as job satisifaction or profitability (Seashore and Bowers, 1970). Specific behaviors were seldom observed or measured in prior literature. One exception was a study by Scheflen, Lawler and Hackman (1971) where the intervention was intended to reduce absenteeism, a specific behavior. The results of the study suggested that participation enhanced the persistence of the improvement in absenteeism. The authors attributed this result to the (1) increased understanding of the intervention purposes and (2) increased committment to change that resulted from participation.

In summary, the literature does not provide substantial data on the effects of interventions on behavior, per se. Another way to address the persistence problem, however, is by asking what factors are most likely to affect persistence. The non-empirical literature on planned change contains a variety of assertions about the importance of learning, committment, knowledge of results and motivation on the success of planned change efforts (e.g.. Argyris, 1970; Margulies and Wallace, 1973; Nadler, 1977). Extending this literature to the proposed model suggests that persistence is a motivation problem, and will be enhanced by factors which contribute to the maintenance of motivation over time. The two factors most frequently cited and best accepted in the literature as manipulatable contributers to persistence are participation and knowledge of results.

## Participation and Persistence

Locke and Schweiger (1979) provide the most extensive review of the participation literature to date. In general, the literature stresses the notion that when individuals perceive some degree of input, choice or control over decisions their committment to the decision, and their subsequent interest in validating its wisdom will be enhanced. Extending this idea to decisions about behavior, when individuals participate in decisions about behaviors, their subsequent performance of the behavior should be enhanced over situations where the behavior is imposed on them. As a phenomenological explanation for this result, Locke and Schweiger focus entirely on the cognitive impact of particpation on beliefs and valuation of outcomes; that is, participation should enhance the perceived value, hence motivational force, for a behavior.

Mitchell (1973), in an integration of participation with the expectancy model, stated that with participation, (1) contingencies (i.e., expectations) are clearer, (2) the likelihood that employees will work for valued outcomes is enhanced, (3) control over one's own behavior is enhanced, and (4) social influence increases. The first three arguments are essentially cognitive and are congruent with Locke and Schweiger. The fourth agreement is social rather than cognitive and illustrates an important point. Participation in the context of change is generally a group phenomenon. It provides an opportunity for individuals to (1) assess the likely social rewards of pursuing a course of action, (2) learn existing group norms and (3) attempt

to influence others. At the group level, it is likely to (1) enhance norm formation and (2) increase the level of social interaction in the group. Hence participation has important implications for the social forces acting on individual behavior in groups. In the coal mine study, it was clear that groups had a strong influence on member behavior. Such influences could have important implications for durability of change.

Knowledge of Results and Persistence

It is almost trivial to assert that feedback may affect persistence. Clearly, knowledge of results has been demonstrated to have implications for the durability of newly learned behavior (Annett, 1969; Conlon, in press). In organizational contexts, however, it is not particularly clear how feedback affects work groups. If feedback is individualized and public, how does the knowledge of one person's outcomes affect others? A variety of social-psychological theories, such as social comparison theory (Goodman, 1977) or modeling (Bandura and Walters, 1964) would stress the importance of other's feedback on behavior. Similar, does group feedback affect individual behavior? What is the joint effect of group and individual feedback? These issues have not been empirically explored in the planned-change literature, although their importance for the persistence problem is obvious.

The present study was an investigation of the joint effects of participation, individual performance feedback and group performance feedback on behavioral persistence and related

indicators. It attempted to capture the social context of work groups, as were present in the mine study. In a sense, the study was exploratory because of the lack of a literature or existing models of these joint effects. There were, however, a set of a priori hypotheses generated from related theories and literatures. These are presented below.

## II. Hypotheses

The selection of dependent and independent variables used in this study, and the hypotheses that relate them, was based both on experiential and theoretical considerations. The first chapter of this report outlines the experiential arguments based on the author's observations of the Rushton study. The theoretical counterpart of these experiences is ambiguous enough that many and substantial literatures could be brought to bear in an attempt to "fully explain" phenomena. Rather than pursuing such a integration, this study was limited to a consideration of a few variables that are likely to promote the persistence of newly introduced behaviors.

### Dependent Variables

It was assumed, consistent with Figure I - 1, that persistence was dependent on the generation and maintenance of beliefs, among individuals, that the new behavior dominated alternatives on the value of outcomes that would accrue from its performance. In the present study, the behavior of interest (i.e., job rotation) was a group activity, hence, the influence of group members on each other was also an issue. The behavioral dependent variables were indicators of persistence. Actual rotation was the group rotating tasks prior to a decision (i.e., a trial) and could be assessed only at a group level. Behavioral intention, however, was an individual level belief and could be assessed on an individual basis. The affective dependent variable

was a set of indicators of the valence or importance that individual placed on performance outcomes. The process dependent variables were indicators of felt social influence and cohesiveness. The importance of these particular indicators originated from the interdependent nature of the task and feedback. For example, it was possible for an individual to want to rotate tasks but be unable to do so because of the unwillingness of others to exchange jobs. Hence, an individual's intention to switch would not be sufficient for him to exhibit the behavior; actual behavior would require social supports as well.

Independent Variables

The model proposed both main and interactive effects of four independent variables: Intervention Style, Group Feedback, Individual Feedback Pattern and Individual Feedback.

Intervention Style. This was the method in which the new behavior was introduced to work groups. The planned change and social psychological literatures stress the benefits of allowing actors to participate in decisions that affect their future outcomes and behavior (see Locke and Schweiger, 1979, for a recent review). Participation, as compared with a unilateral imposition of change, is proported by the literature to create greater committment to the new behavior, increased resistence to change and stronger beliefs about the benefits of the new behavior. All of these outcomes should promote persistence. In addition, Mitchell (1973) hypothesized that participation should also increase the level of social influence in a group so that beliefs and behaviors would be

more susceptible to membership group influence. Again, this factor should impact persistence in a group setting depending on the attitudes of the other group members toward the change.

Two styles were employed in the study. Under the imposed style, the intervention was conducted as a one-way communication with the experimenter telling the group about rotation and its likely benefits, and then asking the group to try it for at least 4 decisions. Under the participative style, the intervention was conducted as a bilateral problem solving session where the problem was improving group and individual performance on the task (i.e., a decision oriented management game). In this condition, the experimenter attempted to generate ideas and then steer the group towards job rotation (see the methods section for a detailed description of procedures). The differences between the imposed and participative styles were that the participative groups were allowed relatively more (1) opportunities to generate alternative courses of action, (2) bilateral discussion of alternatives, costs and benefits and (3) perceived (versus actual) choice in the matter of what alternative to select. It should be noted that groups really were not given the choice not to adopt job rotation. This was always the outcome of the intervention.

Group Feedback. This was information about the performance of the team as a whole. Group feedback for a baseball team might be place in the league standings, win-loss record, number of runners left on base and so forth. There were three group feedback conditions: positive, designating improvement over

pre-intervention levels, negative, designating no improvement, and no group feedback. Since performance improvement was an expected result of the intervention, positive feedback connoted confirmation and negative feedback connoted disconfirmation.

Individual Feedback Pattern. This was the pattern of feedback given to individual members of a team about their personal performance. For example, individual performance to a baseball player might contain his/her batting average, fielding percentage, runs-batted-in and so forth. Feedback to individuals was either positive, designating improvement over pre-intervention levels (i.e., confirming), negative (i.e., disconfirming) or none was given. At the group level, four patterns were induced, +++, -++, --+ or no feedback (N). Patterns were important because (1) feedback was public and could be constructed as information to all team members and (2) feedback patterns could be tied to the number of social influence attempts generated within a team.

Individual Feedback. Individual feedback is simply the information provided to a single individual about his/her performance. Again, this was either positive, negative or none.

Hypothesis about Behavior.

Perhaps the major objective of this study was to examine the impact of the independent variables on a new behavior. In this regard, both main and interactive effects were expected. A popular way to conceptualize behavior is through the expectancy model. Although there are many forms of this model (Mitchell, 1974), the basic assertion is that the force to behave in a

certain way derives from (1) the expectation that a certain mode of performance is possible (i.e., a discrete behavior or a particular level), (2) the strength of beliefs that certain outcomes will accrue from performance and (3) the value (i.e., valence) associated with those outcomes. This model will be used as a general heuristic for developing the hypothesis.

Intervention style, group feedback, individual feedback pattern and individual feedback are all hypothesized to produce main effects on both actual behavior and behavioral intention. In the case of style, participation should affect all three components of the expectancy model as Mitchell (1973) has asserted. In particular, previous authors have suggested that participation increases individual committment to an understanding of the goals of a new behavior (e.g., Coch and French, 1968, Lawler and Hackman, 1969). Increased committment may affect the valence components of the model as well as the strength of beliefs about the viability of rotating. In particular, group outcomes may become more salient to a participative group and expectations about the rotating would be greater where individuals perceive a consensus about trying the behavior in the group. Increased understanding would tend to strengthen the beliefs about those outcomes which caused individuals to adopt the behavior initially. Hence, participation was expected to enhance persistence.

The predicted effects of group and individual feedback were fairly straightforward. Positive feedback was expected to enhance persistence whereas negative feedback would disenhance

persistence. The prediction follows from the reinforcement value of feedback (Annett, 1969) and Bennis and Schein's (1967) notion of confirmation/disconfirmation. In the case of feedback pattern, we expected information not specifically pertaining to an individual to affect him/her vicariously. Hence, behaviors and intentions should be more persistent as positive feedback becomes more prevalent in the group. Equity effects, such as individuals not choosing to rotate in order to avoid inequitable reward distributions, were not expected since subjects were never penalized through a performance decrements, below pre-intervention levels for not rotating.

Two interaction effects were also expected, the major being that between intervention style and feedback types. In particular, intervention style was expected to moderate the effects of group and individual feedback on behavior and behavioral intentions such that the efficacy of individual feedback on determining behaviors and intentions would be greater than that of group feedback in the imposed condition, but would be reversed in the participative condition. There were two rationales for this prediction. First, participation was expected to enhance the value of group preformance. Secondly, participation would induce a "group set" where individual awareness of group performance and group rewards would be greater than for imposed groups.

The second predicted interaction concerned the feedback types and would be visible only at the individual (i.e., intention)

level. In particular, group feedback and individual feedback were expected to interact so that their individual effects on behavioral intentions, when they agreed (i.e., both positive or negative) would be greater than their effects when they were discrepant. The rationale is simply that each type of feedback is more credible when it is in agreement with the other.

Hypotheses about Valences

In the study, affect referred to the value, or in Vroom's (1964) terminology valence, attached to the performance outcomes of the group's task. Two outcomes are of importance: group performance and individual performance. In most organizations, the value of task performance derives from the instrumentality of that performance to both extrinsic and intrinsic outcomes. A financial bonus was offered as a reward for performances as measured on both individual and group dimensions with each type of performance equally tied to the payment. The intention was to create performance outcomes with objectively equal instrumental values. Other sources of outcome valence were not controlled, among these would be social rewards such as praise for good performance or intrinsic task satisfaction from task accomplishment.

The focus of the value hypothesis is on the relationship between the independent variables and the reported valences of group and individual performance.

The first hypothesis was that participation would increase the valence of the group performance outcome but would not affect

that of the individual performance outcome. The rationale was that normally individuals would be more self-centered and focused on individual performance than on group performance because of its clarity as an indicator of individual ability and its relationship to esteem and the discretionary stimuli (Hackman, 1976) issued within the group. It was expected that participation, through its affect on committment to group objectives and the heightening of group awareness, could increase the valence of group performance. Although participation may affect the amount of discretionary stimuli issued in the group, this was not expected to increase the already high salience of public individual performance.

The second and third value hypothesis are parallel and concern the relationship between feedback about an outcome and its valence. The second hypothesis is that individual performance will have higher valence when feedback on individual performance is provided. The third value hypothesis is that group performance will be valued more following feedback on group performance. Stated a bit differently, these hypothesis suggest that outcomes about which individuals have little or no information are not salient (i.e., valued).

Hypotheses about Process.

Group process, according to Steiner (1972), refers to the actual steps taken by an individual or group when confronted by a task including interpersonal and intrapersonal actions and productive or non-productive behaviors. A verbatim indicator of process would necessitate the collection of data on such actions

over time to form process tracings. This study opted for indirect indicators of two particular facets of process.

One of these facets, cohesiveness, refers to the degree to which individual members identify with a group which affects liking of other members, attractiveness of other members and desire to remain with the group. In the context of this study, cohesiveness was considered important because it would affect the impact that the beliefs, behaviors and fates (i.e., performance feedback) of other members of a group would have on a focal member.

The second factor was felt social influence. Social influence bears a close relationship to cohesiveness in that the level of felt influence should generally covary positively with cohesiveness. The difference is that social influence attempts can occur in groups with very low amounts of affiliation, liking or group identification, particularly in this study where task demands required high degrees of interaction and cooperation among group members. An objective in this study was to examine the degree to which group members felt that other members were trying to affect their behavior. An objective in this study was to examine the degree to which group members felt that other members were trying to affect their behavior.

Intervention style was hypothesized to affect both process measures. Participation was expected to produce increased familiarity of members with one-another and to produce stronger norms for interaction (or alternatively, norms for higher levels

of interaction). This would lead to a larger number of influence attempts, affecting social influence, and a greater feeling of identification and affiliation with the group, affecting cohesiveness.

Individual feedback patterns were expected to affect social influence. In particular, when individual feedback was heterogeneous felt social influence should be greater than when homogeneous. A contrasting effect was expected for cohesiveness: that is, heterogeneity should reduce group identification and closeness.

Group feedback was expected to produce both main and interactive effects on felt social influence. The main effect was that negative group feedback would create strong desires for success and, hence, inducements from members of the group to try harder, work differently, etc. Positive or no feedback would not create such an atmosphere.

Group feedback may interact with individual feedback when it creates an impression that one member of the group is "dragging it down". For example, an individual with negative performance feedback in a group where both other individuals receive positive feedback and the group gets negative feedback is likely to receive many cues. Hence, group feedback was expected to interact with individual performance feedback and feedback pattern so that an individual whose minority peformance feedback was perceived as harming group performance reports non-additively high social influence.

Group feedback was expected to produce a main effect and interactive effects on group cohesiveness similar to that proposed for social influence. Cohesiveness was expected to be greater when group feedback was presented, and greatest when it was positive. Negative group feedback coupled with heterogeneity of individual feedback, however, was expected to produce devisiveness, hence low cohesiveness.

# III. Methods

## Subjects

Subjects were 300 undergraduate students at the Georgia Institute of Technology. Subjects were actually recruited by the experimenter through his visits to classes in economics and management where they were asked to volunteer for a study of management simulation games for which they would earn $3.00 per hour for playing a game for about 3-4 hours and completing some questionnaires. As a first step in volunteering, subjects provided their names, phone numbers, and convenient times for scheduling on a file card. Later, these volunteers were contacted by phone and scheduled for an experimental session. Of the 300 volunteers, 227 were males and 73 were females.

Once at the experimental session, subjects were randomly assigned to 3-person groups, thus, forming 100 groups. Four additional groups were used for "debugging" sessions. Another group was excluded from the study because of high suspicion and lack of cooperation during the study. Hence, 105 groups and 315 subjects were employed in the entire study.

Experimental sessions were generally planned to accomodate 3 or 4 groups, hence, a minimum of 9 or 12 subjects were scheduled for each session. Because of an average 25% no-show rate, extra subjects were occasionally scheduled. In the event that the number of subjects arriving at the study was not divisible by 3 (forming groups), subjects were asked to volunteer to return at a later session and were paid $3.00 for showing up. Obtaining such

volunteers was never a problem. Subjects were mailed pay checks about 2 to 4 weeks following their participation.

Procedures

Experimenters. The investigator, for methodological and logistical reasons, hired four graduate and undergraduate students to conduct the experimental sessions. These students were blind to the hypotheses and exact purposes of the study during the data collection period.

Task. On arriving at the experimental session, subjects were briefed as to the nature of management simulation games and were informed about payment procedures. Then, the 3-person game teams were formed and randomly assigned to an experimenter who had previously been assigned to an experimental condition. Groups were assigned to conditions in a manner that maintained equal cell frequencies. After assignment, the experimenter led the group to a separate room to play the management game.

Once at the room, the three subjects were seated at one side of a 2 by 6 foot rectangular table. On the table was a partition which separated both the group from the experimenter at the other side of the table, and prevented each subject from seeing the other subjects' work area on the table (see Figure III-1). In front of each subject was a slot through which he/she could slide documents to the experimenter. Each subject was provided with a description of the game (see Appendix 1) and a stack of order forms (see Appendix 2). The game description consisted of 9 pages.

The first 7 pages were identical for all experimental conditions and provided information about how to play the "Downtown Deli Game". Briefly, this game required that the 3 subjects act as a team managing the "Downtown Deli's" in Toronto, Canada. There were 3 "fresh daily" products that had to be ordered for the 3 deli's; they were coffee, "Mr. Cookie" --a large raisin and oatmeal cookie, and vichyssoise. Each player was put in charge of 1 of these products and was told his job was to order an amount that would be sold the next day since it would be discarded at the end of the day. The mark-up on each product was about 100% of cost so the impact of underordering (i.e. profit forgone) and overordering (i.e. waste) was equal. Prior to making an ordering decision, subjects were provided with data concerning the forcasted temperature, chance of precipitation, concert hall appearances, convention and day of the week for the following day.

The final two pages varied according to experimental condition and outlined the feedback and evaluation procedures to be imposed on the team. In all conditions, subjects were told that performance would be monitored and compared to other individuals and teams who had played the game in prior studies. They were told that a bonus of up to $10.00 was available to individuals based on a combination of individual and group performance. Individual performance was indicated for each player as a % deviation from the optimal order. Group performance was the % deviation from maximum profit for the team. In both cases,

the bonus was to be paid contingent on performance relative to a norm derived from prior studies. Depending on experimental condition, subjects were then told they would receive feedback on individual performance, group performance, both or neither. A sample feedback form was then provided which displayed the % deviation information and an indication of whether performance was above (+) or below (-) average for individuals and/or groups in other studies (see Figure III-2).

It was stressed that the ordering task was interdependent; that is, the amount ordered of one product could affect the sales of other products because cookies could be ordered with coffee, etc. Hence, subjects were advised to keep track of the sales of other products and were provided paper for that purpose.

Finally, the relationship of performance to rewards was described on the final page of the instructions. This page also outlined the feedback procedures and varied according to experimental conditions. The relationships of performances to rewards, however, was held constant. Subjects were told that a bonus of up to ten dollars, per person was available based on an equal consideration of groups and individual performance. This bonus would be based on how these performances compared to those of other individuals and groups who had played this game. The purpose of this bonus, which was never paid, was to induce/control the instrumental value of both types of performance.

The experimenter read the game description aloud while subjects read silently. Following the reading, questions were

solicited and answered. Following this, a practice trial was conducted. In each trial, the team was provided with game information (i.e. weather, concert, etc.) and was given two minutes to order. Orders were made independently by each subject without consultation with other players or knowledge of their orders. Following the ordering, subjects were encouraged to discuss their orders while the experimenter calculated feedback. The experimenter then, provided a single feedback form to the team depending on feedback condition and allowed the group two minutes to discuss the feedback. Not including the practice trial, twenty-one trials were run. The information provided for each decision is provided in Appendix 3. After trial 10, the game was interrupted for an intervention (see below) and after trial 15, subjects were given a dummy activity (completing a short internal/external personality questionnaire) to interupt the game for a time. After trial 21, a post experimental questionnaire was administered to assess a variety of dependent variables and manupulation checks.

At the end of the experimental session subjects were totally debriefed as to the purpose of the study. As part of this debriefing, they were urged not to reveal the true purpose of the study and were provided with a cover story with which to respond to inquiries. This technique has proven very effective in preventing "contamination" of the pool of participants.

Experimental Design

Two styles of intervention were combined with four patterns of group feedback to create the partially crossed factorial design outlined in Figure III-3. A full description of each factor is presented below. The rationale for a partially crossed design is that certain combinations of feedback are not possible with the task, for example, where the individuals all perform well but the group fails. This design permits an examination of the main effects for each factor and all interactions in the 2x3x3 full factorial design where the partially crossed level of individual feedback was excluded. The excluded cells could, then, be used for specific comparisons where appropriate. Five, 3-person groups were distributed to each experimental condition.

Intervention Style Manipulation. A major objective of the study was to examine the impact of intervention style which was defined as the manner in which a new work behavior was introduced to the game teams. The new work behavior and certain information were the same regardless of style. The new behavior was job rotation; that is, after each trial subjects were to switch the product they were ordering in a rotating fashion (i.e. coffee goes to cookie, cookie to vichyssoise and vichyssoise to coffee). Regardless of style, subjects were asked to try rotation through the fourteenth decision (i.e. 4 trials). Additionally, the intervention always began with the experimenter noting that about one-half the time the particular group and players were above average, and the other half below average which made the group's overall performance about average. He, then, noted that when

teams played the game as a course requirement, they had some discretion about how the game would be played and that 95% of the teams that perform below average or at average do so because they never learn to manage the interdependencies among the products. The moderator stressed that a "big picture" of the market was important for good performance. At this point, the new behavior was introduced in either an imposed or participative fashion.

In the imposed intervention style, the game teams were directed to use job rotation by the moderator without any bilateral discussion of other alternatives for improving performance or of reasons why job rotation should facilitate performance. The experimenter told the group to try job rotation for at least four trials and at that time, they could decide about continuing. He added that historically job rotation improves performance in about one half the groups who try it. Groups are cautioned not to expect immediate improvement, but that a better picture of the market should develop after two or three switches and by decision 14 any resulting performance change should be evident. Finally, the experimenter stated that rotation works because it "helps players develop a better understanding of the market".

The participative intervention differed from the imposed in several respects. First, the participative intervention presented the problem of improving performance as an issue for discussion. Secondly, groups were encouraged to generate a set of ways to do the task differently that would improve performance. Finally,

once job rotation was raised as an alternative, the group was encouraged to analyze why it might improve performance. All of these are in contrast to the imposed style where a single alternative is offered and rationalized unilaterally by the experimenter.

Operationally, participation was created through a sequence of statements by the experimenter. First, group and individual performance was identified as "average". The experimenter, then, suggested that, in his experience, the high performing groups are those which develop a broader picture of the market and product interdependencies, and subsequently asked for suggestions about work procedures that would facilitate learning about the market. Suggestions were solicited in a "round robin" fashion with the experimenter encouraging as many suggestions as possible. Then, if the group had generated job rotation as a suggestion, the experimenter singled it out for discussion by stating that "other groups have tried it and it works for about one half of them". If the group did not generate it themselves, the experimenter then said" ...some groups have tried job rotation. (Explains) ...and this has improved performance for about one half of them. Then, the group was encouraged to generate reasons why job rotation might work. The experimenter then summarized by suggesting that job rotation "avoids the tunnel vision of focusing only on one product". The group was then asked whether they wanted to try rotation, or to consider some other method. Most groups chose rotation. For those groups wanting other methods, the

investigator discouraged them by suggesting they had failed to help other groups. Often, the alternative methods were not permitted by the rules of the simulation (e.g., group discussion of the decision) and, hence, the moderator indicated that they were prohibited. If these tactics failed, the experimenter asked the group to try rotation. As in the imposed case, all groups were asked to try rotation for at least four trials at which time they could decide whether to continue or not.

Feedback Manipulation. Feedback, in this study, refers to information about the performance of individuals, the group, or both. In both the individual and group cases, two types of information were provided. First, data were provided concerning size and sign of the deviation of the decision from optimal. Secondly, this deviation was labeled as either above or below the average for all groups in previous studies for that particular set of information. Feedback was falsified throughout the study. For the first ten trials (i.e., until the intervention), feedback was about the same for all players and groups and indicated an average performance level. After the intervention, feedback was contingent on whether all members of the group rotated tasks.

At the group level four patterns of individual feedback were produced. Patterns were defined by whether or not the performance of particular individuals in a group improves as a result of job rotation. Using "+" to denote improvement contingent on switching and "-" to denote stability, the patterns were "--+", "-++", "+++" and none. wasThe "---" patterns, although planned, was not used

because of the failure of the "--+" pattern to produce rotation. Table III-1 contains the specific feedback schedules used to produce these patterns. An individual's feedback was dependent on where he/she sat behind the partition, and continued to be associated with him/her regardless of product. As is evident from the table, feedback was invariant in the first 10 trials. After trial 10, feedback was contingent on switching. In a "+" condition, an individual's deviation score would continue to shrink as long as the group rotated. In addition, performance would be reported as above average. Once switching stopped, however, the "+" individual's deviation scores would experience a gradual return to pre-intervention levels and below average performance would be reported. In the "-" case, switching did not affect feedback, hence, deviation scores remained at a pre-intervention plateau generally reported as below average regardless of behavior. The table is designed so that for a "+" individual, not switching results in moving to the right and down. Additionally, a return to switching would result in moving to the left and down.

An important aspect of individual feedback was whether the actual order was above or below the optimal (i.e., the sign of the deviation). In order to maintain the credibility of the feedback, this aspect of feedback was controlled by whether or not the actual order was above or below an optimal based on a linear model that related the game information (i.e., day, weather, etc.) to sales for each product. Hence, there was some logic to the sign

associated with the deviation. The false feedback was also designed, in the first ten trials, to create an illusion of learning (i.e., improvement over time). Both of these measures were intended to reduce suspicion about feedback and to create an illusion of verdicality.

Individual feedback, when provided, was presented using the upper portion of the feedback form shown in Figure III-2. As noted above, the relationship of individual performance to the average of former players was tied to the bonus, hence, subjects were encouraged to focus on that part of the feedback. The feedback was presented on a single sheet, thus, making individual performance data available to all three members of the group (i.e., public).

Feedback was also provided to some subjects about the performance of the group as a whole. Group performance was defined as the percentage of maximum possible profit earned by a team on a particular decision. These subjects were told that the marginal contribution of each product to profit was roughly equal and varied slightly to reflect changes in costs over the course of the game. Additionally, subjects were told that the profit (or loss) encumbered by over or under-ordering was symmetric around the optimal order. Because of the innate relationship between individual performance and profit, group feedback was structured a bit differently from individual feedback. For the latter, "+" feedback entailed an improvement in deviation scores and a report that the deviation was above average. Similarly, "-" feedback

indicated relatively constant deviation scores and a report that the deviation was below average. Because individual and group feedback were to be presented jointly and crossed in the experimental design, group feedback was contingent on individual performance, hence, it was necessary that the deviation score for group feedback be kept near the average of the deviation scores for the group members. The "+" or "-" aspect of group feedback, then, was conveyed by the comparison of the deviation with the average deviation of other groups. Table III-2 presents the actual group feedback data and is structured similarly to Table III-1 for individual feedback.

Group feedback, when provided, was presented using the lower portion of the feedback form shown in Figure III-2. As noted above, the relationship of group performance to that of former groups was tied to a bonus, hence, subjects were encouraged to attend to that portion of the feedback. Like individual feedback, group feedback was known to all members of the group.

Measures

The three classes of dependent variables in the present study were job rotation behavior, beliefs about rotation and group process measures. Except for switching behavior, all of these were assessed using the post-experimental questionnaire. In addition to the dependent measure, a number of itmes were included in the questionnaire to assess the effects of some of the experimental manipulations.

Manipulation Measures. Several items were used to assess the effects of the manipulations of intervention style and feedback. The effects of style were measured using the items displayed in Table III-3. Prior literature suggested that style would affect subject's perceptions of (1) free choice in adopting, (2) committment to the new behavior, and (3) group consensus about adopting. Several items were written to assess each of these. In addition, the strength of beliefs about product interdependencies, the major rationale for job rotation, were also assessed with the expectation that style would affect acceptance of the rationale. Finally, an item that asked subjects to retrospectively indicate their expectation that rotation would increase performance was also included.

Job Rotation. Job rotation refers to the actual behavior of exchanging jobs between each decision. For each trial, rotation was recorded by the experimenter and was coded as "1" if all members exchanged jobs or "0" if all members did not exchange jobs. Hence, rotation was recorded as an "all or none" or group level phenomenon. Because groups were forced to rotate on trials 10 through 14, the only trials relevant for switching were decisions 15 through 21 allowing for a total of 7 exchanges. Job exchange never accured spontaneously (i.e., prior to trial 10), and only twice occured among two of three group members (i.e., incomplete rotation).

The measurement of rotation on a trial by trial basis allowed for a variety of operationalizations of the behavior. Two were

used in this study. The simplest of these was to aggregate the total number of trials for which rotation occurred which resulted in a variate ranging from 0 (i.e., no voluntary exchange) to 7 (i.e., exchange on all trials). This operationalization simply provided a measure of the frequency with which voluntary rotation occurred. The other operationalization concerned the number of continuous trials for which rotation occured following trial 14; that is, the number of trials that occured before a decision to stop rotating was reached. This operationalization would not reflect the possibility that a group would stop then return to rotating. Both of the operationalizations was used in order to obtain the clearest possible interpretation of experimental effects.

Belief Measures. Two classes of beliefs were assessed in the study. These were (1) behavioral intention, and (2) outcome valences. Each of these is discussed below.

Behavioral intention was measured by the single item "The next time you play this management game, what is the likelihood that you will use the procedure of job rotation to make decisions," followed by a subjective probability scale ranging from 0 out of 10 to 10 out of 10 chances. This method of measurement for behavioral intentions has been endorsed by Fishbein and Ajzen (1976) and used successfully in a similar study by the author (Conlon, in press).

Valences were measured using the items displayed in Table III-4. Two outcomes were examined; they were, the group's outcome

(i.e., profit) and the individual's outcome (i.e., performance on an item). Each of these was examined as (1) an outcome and (2) and instrumental step to a bonus (i.e., pay) outcome.

Process Measures. Group process generally referred to how a group combines its resources to produce a group output. In this study, hypothesis were formed about the process indicators of cohesiveness and felt influence. Each of these indicators, although not exact renditions of the interactions that took place, provides a general description of the interpersonal atmosphere of a group as perceived by its members. More specifically, cohesiveness reflects the degree to which members are "concerned with their membership (in a group) and are therefore, more strongly motivated to contribute to the group's welfare" (Cartwright, 1968, brackets mine). Thus, cohesiveness indicates individual member willingness to contribute to group oriented outcomes. Similarly, influence, in this study refers to the degree to which members of a group emited stimuli in an attempt to affect the task behavior of others (cf. Hackman, 1976). Again, influence perceptions do not replicate the interaction process rather they reflect the beliefs of individual members about forces for conformly in the group -- a reflection of the actual interactions.

Despite the centrality of the construct of cohesiveness in the group dynamics literature, there are no standardized instruments for measuring it. For the present study, an instrument was constructed based on Cartwright's (1968) review of

the construct and its various operationalizations. According to the review, cohesiveness has been variously conceptualized and/or measured as interpersonal attraction, evaluation of a group as a whole, closeness or identification with a group and expressed desire to remain with a group. A composite scale was constructed by sampling items from each of these domains. Whenever possible, items were constructed by consulting the literature cited by Cartwright and modifying existing items -- often these items were manipulation checks for experimental inductions of cohesiveness (eg. Schachter, 1951). The resulting scale and particular dimensions tapped by each item is displayed in Table III-5.

In contrast to cohesiveness, several methods have been advanced to study influence in organizations. Patchen (1963) distinguishes between "global" and "specific" questionnaire methodologies where global methods assess influence in general and specific methods assess influence over specific areas of organizational functioning. Generally, both types of items utilize the stem "influence" and specify (1) the influencing agent (eg. a person, a group, "people in a department") and the area of influence (eg. "what goes on in my department", pay, decision making). Usually, the purpose of such influence measures is to describe power structures in a firm (eg. Tannenbaum and Kahn, 1958).

In the present study it was decided to combine general influence items with items about influence over job rotation. In both cases, the influencing agent was specified as "members of the

group" and individuals were asked to report about "felt influence" that is, influence on self. The 4 influence items are displayed in Table III-6.

Analysis

There were two stages of analysis. In the first stage, the characteristics of individual items and scales were examined using correlational analyses. When more than two items were used to measure a single construct, as was the case with the process variables, coefficient alpha was calculated as an indicator of internal consistency. These analyses were performed using the PEARSON CORR and RELIABILITY routines of the Statistical Package for the Social Sciences (SPSS) (Nie, Hull, Jenkins, Stienbrenner and Bent, 1975)

In the second stage, specific hypothesis were tested. The SPSS MANOUA package was used as a general analytic tool to test ANOVA models with univariate or multivariate dependent variables. The exact model tested depended on the particular dependent variable and the hypotheses.

# IV. Results

This Section is presented in three parts: (1) assessment of the experimental indicators, (2) construction of measures and (3) tests of hypothesis.

## Experimental Manipulation Assessments

Items were included in the post experimental questionnaire to evaluate the effects of the intervention style and feedback inductions.

**Intervention Style Assessment.** The effect of participation was investigated using the items presented in Table III-3. These items were intended to assess those perceptions which, according to the prior literature or the present study, could be expected to vary according to intervention style. The first two items tapped perceived choice of adopting the behavior, the second two assessed perceived input-to and responsibility for the decision to adopt. The next two items assessed perceived consensus in the group about adopting, the next two items assessed perceived committment to job rotation and the last item assessed initial beliefs about the efficacy of rotation for improving performance.

These items were analyzed using the SPSS MANOVA program and the main effect of intervention style was examined. The results are presented in Table IV-1. The multivariate test indicated a highly significant impact of style on the item vector. This effect could be further interpreted using either the univariate effects of style on each item, or correlations of the individual

items with the canonical variate (i.e., linear combination of items produced by MANOVA (Borgen and Seling, 1978). Both data are presented in Table IV-1. The univariate MANOVA and correlational results appeared to provide converging interpretations. Specifically, participation produced stronger perceptions of input and responsibility for adoption and beliefs that job rotation was a good idea and would lead to positive outcomes as expected according to the hypothesis of the study and prior literature. Several unexpected effects were also obtained. First, style did not affect the degree of perceived choice in the adoption or committment to rotation. The absence of these effects will be discussed in greater detail in the next section of this report, but briefly, the absence of committment may have been due to the ad hoc nature of the study, and the absence of perceived choice may have been the result of a group decision rather than a purely individual decision to rotate tasks. The second unexpected result concerns the effect of style on perceived consensus. Both consensus items were significant, but in opposite directions. The item that produced the expected result of greater consensus following participation (i.e., Ra 8), contained specific reference to rotation being a good idea. The second item (Ra 19) did not contain that reference, and focused upon "some disagreement" rather than "strong agreement". The production of both effects simultaneously suggests that participation may not produce consensus as much as it makes group members more aware of the feelings of others about the new behavior (i.e., a natural result

of discussion). Thus, when the majority of group members favor adoption of a particular behavior, strong social supports would exist for favorable opinions which may affect later persistence. This would not, however, proclude disagreement. In fact, disagreement would be more visible.

The canonical vector of items produced by MANOVA for the main effect of style may be interpreted through the individual item correlations with the composite. These suggest that the vector is dominated primarily by positive beliefs about the effects of rotation and secondarily, by perceived input-to and responsibility for adopting rotation.

Feedback Assessment. The design of the study crossed two types of feedback, group and individual, in a manner that one may be positive and the other negative. Also, the feedback provided was standardized and false. A problem that these aspects of the design may produce is the possibility that subjects were either generally suspicious about the study and feedback was not believed, or that certain crossed conditions of feedback were simply not believable and subjects in those conditions would discount either or both type of feedback.

Two items were used to examine the credibility of feedback. The first of the feedback items (Re 6) examined feedback as a "learning indicator" and the second examined perceived "accuracy". The second item was also reverse worded so that a greater endorsement meant less perceived accuracy. The means for these items are presented, by experimental condition and overall, in

Table IV-2. The overall means for the items are 4.04 and 3.78 respectively on a 6-point scale indicating that subjects were neither strongly disposed to accept nor reject the feedback. There was, however, some variation by experimental condition. In order to investigate this variation, separate ANOVA's were performed on each item using all four independent variables as factors, but excluding the no feedback levels of both types of feedback because of their irrelevance to the evaluation of feedback credibility.

The results of this analysis indicated a main effect of the individual feedback pattern on the learning indicator item ($F = p < .03$). Learning was judged to be greater in the -++ condition than in the --+ condition which is consistent with the notion that improvement (i.e., positive feedback) indicates learning. Interestingly, it was the individual feedback pattern rather than simply individual feedback that produced the effect. The other significant effect on this item was a style by group feedback by individual feedback pattern interaction ($F = 5.29$; $P < .03$). The most critical aspect of this manipulation check would be the interaction between group and individual feedback. The 3-way interaction suggests that style moderates this. In particular, with an imposed style, the incongruity between the two types of feedback has no effect when group feedback is negative but a large effect when group feedback is positive. Another facet of the interaction is that the learning indicator is greatest when feedback is congruent and favorable following the imposed

intervention. Learning is rated lowest when the group feedback is positive yet the majority of the group gets negative feedback following the imposed intervention. Interestingly, the effect on learning only occurs when there is an incongruence between positive group and individual feedback, and not for negative group feedback. This pattern is different following the participative intervention. In particular, the positivity of feedback affects learning perceptions. Discrepancies do not seem to have any effect following the participative intervention. In summary, the impact of feedback discrepancies on reported learning is only evident when after an imposed intervention and the majority of the group receives negative feedback while group feedback is positive.

The accuracy of feedback item (Re 6) was reverse scored so that the higher the response, the less the perceived accuracy. As with the learning item, the major concern was that discrepant group and individual feedback would create concern with the accuracy of the information. The only significant effect revealed by a univariate ANOVA on the item was a style by group feedback by individual feedback interaction ($F = 4.16$; $P < .04$) which is diagramed in Figure IV-X. After the imposed intervention, the least accuracy was perceived when the majority of the group obtained positive individual feedback, but the group feedback was negative. After the participative interventions, negative group feedback produced accuracy perceptions that were unaffected by individual feedback. In the positive group feedback condition, however, perceived accuracy was much greater in the discrepant

than in the congruent condition.

Generally, the overall means for these items suggest that feedback was generally credible. The obtained interactions, however, are fairly anomalous and difficult to interpret. For both items, discrepancies seem to matter only after imposed interventions. In the participative condition, the sign of the group feedback appears to affect feedback perception where negative feedback is generally less credible. Several other facets of the interaction remain, for the present, unexplainable.

A final item assessed general suspicion about the study (Re 8). The overall mean for this was 3.78, again about the mid-point of the six point scale. An ANOVA on this item revealed no significant relationships between the experimental conditions and suspicion.

Construction of Measures

As noted in the prior sections of this report, there were three classes of dependent variables in the study: Behavioral, affective and process measures.

Behavioral Measures. The behavioral dependent variables were objective observations of behavior and subjective assessments of behavioral intention. The latter was measured using a single subjective probability measure (i.e., chance out of 10) as suggested by Fishbein and Ajzen (1976). The actual behavior measure was observed through subject's initials on the order form and the experimenter's ongoing recording of rotations. This measure yielded a yes/no indicator of rotation for each trial.

There were no rotation attempts prior to trial 10. After trial 10, groups always rotated through trial 14. Hence, all variance in rotation began with trial 15.

The simplest measure of rotation was frequency of rotation following trial 14. This simply resulted in a ratio scale ranging from 0 to 7. A second indicator was constructed to measure consecutive trials until rotation was not employed. This, again, resulted in a ratio scale ranging from 0 to 7. The former measure, then, represents a frequency view of persistence, whereas the latter is a serial view.

Affective Measures. The effect on the valence of the two performance outcomes, individual and group, was measured in two ways, both employing 6 point Likert type measures. In one way, individuals were asked simply to indicate the importance of the outcomes. In the other way, individuals were asked to assess the instrumental importance of the outcomes for the bonus payment. These measures required no further development.

Process Measures. The process measures used in the study were developed from individual items having apparent face validity. Some of the individual items were adopted from existing measures as outlined in Section III of this report. Reliability and validity were examined for each measure.

The reliability of both scales was assessed through coefficient alpha (Nunnally, 1973) using SPSS RELIABILITY. This indicator, based on the overall internal consistency of the items utilized in the scales, was justified by the assumption that each

measure had only one factor (Campbell, 1976). The obtained alpha for the eleven item cohesiveness scale was .802, a very good level for research purposes. The four item social influence scale had a reliability estimate of .497, a barely acceptable level. The reason for the low reliability of the latter probably resulted from the absence of a good conceptual foundation for the construct as was available for the cohesiveness measure.

The design of the study also provided a crude indicator of convergent validity through multirater methods. In particular, the blind experimenters were required to evaluate about 80% of the groups on a six point semantic differential. One of the semantic differential items was "cohesive--non-cohesive" which could be constructed as an alternative indicator of group cohesiveness. The semantic differentials "silent--talkative", "argumentative--accepting", "peaceful--conflicting" and "high pressure--low pressure" could be construed as expected correlates of social influence within a group. Correlations were obtained between these items and the respective scale items. A decision was made to perform this analysis on an individual perception basis, hence, the group perception of the experimenter was "disaggregated" and correlated with the individual reponses of group members. The resulting correlations are presented in Table IV-3.

For the cohesiveness measure, six of the eleven possible correlations were significant at or below the .05 level. Two more were significant at or below the .1 level. This provides substantial support for the individual item validity of the

measure. Unfortunately, support was not received on the composite validity of the scale. The multivariate regression of the cohesiveness measure on the differential was not significant (Wilks Lambda = .938, P< .21).

For the reliability measure, only five of the sixteen possible correlations were significant at or below the .05 level. This, does not make a particularly strong case for individual item validity. Clearly, item RA15 appears to be the most valid item. As with the cohesiveness measure, support was not received for for the composite validity of the measure (Wilks Lambda = .919, P < .23).

The failure of the present study to demonstrate strong evidence of validity for the process measures may be explained in a variety of ways. One explanation is that the measures used were simply not valid. This conclusion ignores the face validity of the measures and would cast doubt as to the existence of the constructs. A second explanation is that the measures should not have been expected to converge. Several factors may be used to justify the latter explanation. One factor might have involved the inadequacy of the semantic differential measures as indicators. For example, the anchors "cohesive--non-cohesive" may have received a different interpretation by the experimenter than is implied by the content of the items presented to the subjects. Did "cohesiveness" imply group identity, closeness, attractiveness and desire to remain to the experimenters? Another reason for not expecting convergence is the perceptual nature of the constructs.

It may be the case that cohesiveness and social influence are "experimental" constructs and cannot be adequately determined by a third party. For example, discretionary cues may be perceived and/or interpreted as influence attempts only by the target and not by the uninvolved observer. In any case, the lack of strong convergence weakens the present case for using the process measures, especially for the social influence indicator.

Tests of Hypotheses

An unusual facet of the present study was the employment of measurement techniques at both the group and the individual levels of analysis. Of necessity, then, at least two models were required to analyze the data. At the group level, two levels of intervention style, three levels of group feedback and three levels of individual feedback patterns were used in a fully crossed factorial design. This model will be referred to as model A. The "+++" individual feedback cells could not be crossed with group feedback and including them in the analytic model would preclude assessments of group and individual feedback interactions. The "+++" cells were be used only for testing hypotheses that specifically required them.

At the individual level of analysis, the individual feedback factor became operational. However, the complete crossing of individual feedback with individual feedback pattern was not possible because of the absence of "+" or "-" individual feedback in the no feedback pattern conditions and of the no individual feedback conditions in the "--+" and the "-++" condition. Two

models, therefore, were applied at this level of analysis.

In model B, all "no feedback" conditions were omitted resulting in a completely crossed design with intervention style, group feedback, individual feedback pattern and individual feedback each having two levels (i.e., a 2 x 2 x 2 x 2 factorial design). An interesting aspect of this design was that conceptually, it could be meaningful to omit the "no feedback" condition on the basis that it is not a feedback condition, rather, it might be viewed as a control condition.

In model C, the pattern aspect of individual feedback was disregarded. The design completely crossed the two levels of intervention style with the three levels of group feedback (i.e., none, -, +) and three levels of individual feedback (i.e., none, -, +) thus forming a 2 x 3 x 3 factorial design. The main drawback of this design was its inability to capture the main effect of feedback to others and the interaction of feedback to others with feedback to a focal person. Such effects, however, were investigated in model B without including the no feedback condition.

The three models described above were used at those points in the analysis where they were appropriate. The knowledgable reader may have already noted two things. First, the models outlined above produce different estimates of mean squared error (MSE). This was especially important with regard to models B and C because they were both applied to the same set of dependent variables. One facet of this problem is that if the individual

feedback factor in model B captures significant variance, then model C is incorrectly specified and the variance that would have been captured by individual feedback becomes error variance. The other facet is that the estimates of MSE are based on different data with model C utilizing more observations than model B. The investigator attempted to avoid the problem of different MSE's by using the DESIGN feature of SPSS MANOVA to nest the individual feedback within only certain levels of feedback pattern. Unfortunately, all attempts to do this failed. The result was the utilization of both models for some of the analyses and extra care in interpretation of results.

A second characteristic of the models outlined above was that they were all complete ANOVA models. The hypotheses of the study, however, seldom necessitated an examination of all contrasts enabled by ANOVA. The presentation of results in this report contains complete ANOVA tables as a matter of style and conceptual interest, even though some of the contrasts contained in the tables may not have been hypothesized.

Specific tests of hypotheses are presented below and categorized by class of dependent variable.

Behavioral Measures. The hypotheses about the behavioral variables were the same regardless of the particular measure. The first hypothesis predicted a main effect for all independent variables. In the case of the actual behavior measures, this implies greater rotation following participative interventions,

positive group feedback and positive individual feedback. The conditional means for each form of the actual behavior measures are provided in Table IV-4. The ANOVA's on these are presented in Table IV-5. The data supported the main effects hypothesis for group feedback ($F=10.22$, $P < .001$) and individual feedback pattern ($F=12.96$, $P < .001$) on the frequency of behavior measure and likewise ($F=7.95$, $P < .001$, $F=11.26$, $P < .001$) on the consecutive rotations measure. In both cases, the effect of style was not significant, although the means were in the expected direction. Table IV-6 contains the conditional means for the behavioral intention item and Table IV-7 contains the ANOVA's for both measures. The model A analysis confirms the main effect hypotheses for style ($F=16.6$, $P < .001$), group feedback ($F=18.9$, $P < .001$) and individual pattern ($F=25.5$, $P < .001$). When model B is used to separate individual feedback from individual feedback pattern, however, it becomes clear that individual feedback to the subject accounts for the model A result and that feedback to others (i.e., the pattern) has no main effect. Model C again confirms the strong effect of individual feedback ($F=6.25$, $P < .014$). Note that because this model creates a non- orthogonal design, multicollinearity results and problems arise in estimating effects. In the present case, the individual feedback pattern was given priority in a hierarchical model (i.e., shared variance was allocated to pattern). This provides the most conservative estimate for the individual feedback measure.

In summary for the main effect hypothesis, both individual and group feedback produced the expected effects. Style had the predicted effect only on the behavioral intention measure, and the pattern of feedback to the group had no significant main effect on intention over and above that produced by feedback to the target individual. Presumably, the individual level effect accounts for the significant effect of the pattern at the group level of analysis.

The second hypothesis predicted that intervention style would moderate the feedback effects. In terms of an ANOVA, this suggests 2-way interactions between style and each type of feedback. Table IV-5 indicates no significant interaction effects for either of the actual behavior measures. Likewise, for behavioral intention, Table IV-7 indicates no significant two-way interactions between either of the feedback condition and style in any of the ANOVA models. There are, however, significant three-way interactions in models A and C and a two-way interaction between style and group feedback that is nearly significant at the .05 level in model B. The most appropriate tests of the hypotheses are provided by models B and C. Model B is especially appropriate if one discounts "no feedback" as a feedback condition and is interested only in situations where feedback is available. The style by group feedback interaction ($F=3.53$, $P$ .063) suggests the hypothesized trend. In particular, the mean behavioral intentions following an imposed intervention are 4.7 for "+" group feedback and 3.2 for "-" group feedback. The corresponding means

following the participative intervention are 8.33 in the "+" group feedback condition and 3.8 in the "-" group feedback condition. These means indicate that group feedback has a much larger impact on the means following the participative induction than following the imposed, thus supporting the hypothesis for the case of group feedback.

The result for model C is much more complex. The conditional means for model C are plotted in Figure IV-2. A generally useful way to think about a three way interaction is that two of the variables interact, but the way they interact is affected by the third variable. In the Figure, interactions between style and feedback conditions are evident from differences in the slopes of the lines that connect the means in the two style conditions. It is very clear that group feedback interacts with intervention style when no individual feedback is provided, and that the particular interaction disappears when individual feedback is provided. The negative slope of the "+,N" line indicates that when positive feedback is provided in the imposed condition, it has a large impact on behavioral intention as long as individual feedback is not provided. There are several explanations for this effect, the most plausable of which is suggested by the effect of the joint presentation of both types of feedback. The data suggest that group feedback has the greatest impact on conditional means when not coupled with any type of individual feedback, positive or negative. For example, the mean behavioral intention in the "+" group, "+++" individual imposed condition is 5.06,

considerably less than 9.6. Apparantly, for the cooperative task employed in this study, positive group feedback presented above provides the greatest inducement for rotation regardless of intervention style. The second apparent non-additivity in the data is the effect of participation on group feedback. By comparing the slopes of the "(+,+)" and "(+,-)" lines with those of the "(-,+)" and "(-,-)" lines the group feedback trends can be visualized. Figure IV-2 illustrates what the group feedback by style interaction would be excluding the "no" individual feedback condition. The figure illustrates that the effect of positive group feedback is enhanced by participation but the effect of negative group feedback is not. Again, this result provides some support for the hypotheses with regard to group feedback. The hypothesized effect on group feedback is not supported.

The third and final hypothesis predicted that the effect of the joint presentation of congruent group and individual feedback would to be greater than the sum of the effects (i.e., non-additive). This hypothesis suggests a group feedback by individual feedback interaction. None of the models produced such an interaction. The three way interaction analyzed above, for model three, could potentially indicate such an interaction moderated by intervention style. The means, however, do not support such a pattern.

In summary, for the behavioral indicators, there was strong support for the main effect hypotheses in the case of intervention style, group feedback and individual feedback. There was no main

effect of individual feedback pattern on behavioral intention and it is likely that the effect of individual feedback pattern on actual rotation was a result of individual feedback and not the composite pattern to the group. The data also partially support the second hypothesis. Specifically, the efficacy of positive group feedback in affecting behavioral intention appeared to be enhanced by participation. This effect, however, was contingent on the joint presentation of individual feedback because of the uniformly high efficacy of positive group feedback when individual feedback was absent. Participation, however, did not appear to attenuate the effect of individual feedback or enhance negative group feedback. Finally, group and individual feedback did not interact as hypothesized.

Valence Measures. Model A was used to examine the valence hypotheses. Four items were used to measure valence two for individual level outcomes (i.e., RC3,RC6) and two for group outcomes (i.e., RC1, RC4). These were combined as dependent variables in a MANOVA on model A. The results of this analysis are outlined in Table IV-8.

The hypotheses about valences were (1) that participation would increase the valence of the group outcome. And (2) the presence of feedback about an outcome would enhance its value. The first hypothesis was tested by observing the main effect of style. This effect was not significant, hence the hypothesis was not supported. The second hypothesis was tested by observing main

effects for group feedback and individual feedback condition. The group feedback was not significant. The individual feedback pattern, however, produced a main effect which can be interpreted by examining the correlations of the individual items with the canonical variate. It is clear that individual feedback was affecting the group outcome valence in one direction, and the individual outcome valence in another. In particular, an examination of the conditional means for the most highly correlated item (i.e., RC1) indicated that the valence of the group outcome was enhanced by the presence of individual feedback. The mean for this item was about 2.0 when indiviudal feedback was absent, and 2.4 when present. The reverse trend was true for individual outcome valences, although neither of these items exhibited significant univariate main effects. These results, of course, fail to support the hypothesis, but suggest a different one. One interpretation of the result is that because the feedback patterns always contained some "-" feedback to a group member, presentation of the feedback led to devaluation of individual outcome valence, and enhancement of group outcome valence. This interpretation was tested using model C, and was supported in the case of group outcome valences. Individual outcome valences, however, were not affected.

An additional result of the analysis of the valence measures was an unhypothesized group by individual feedback pattern interaction. An examination of the individual measures with regard to this interaction reveals that, again, the group outcome

valences were most affected. An examination of the conditional means for item 4, the most highly correlated with the canonical variate, indicated that when group feedback was absent or negative, the no individual or dominant positive individual (i.e., --+) feedback had higher group outcome valences. This trend was reversed for positive group feedback. This interaction may be interpreted as supporting the proposition presented above about the effect of negative individual feedback an the importance of the group outcome. When individual performances was poor, group performance assumed a higher value.

Process Measures. The process measures used in this study were multi-item indicators of cohesiveness and social influence. Models A, B and C were applied to each of these scales. The results of these analyses are presented in Table IV-9 for cohesiveness and Table IV-10 for social influence. Figures IV-3 and IV-4 illustrate the significant effects.

The first hypothesis about the process measures was that participation would increase felt social influence and cohesiveness. This hypothesis was tested by examining the main effect of style. For both measures, the effect was not significant, thus failing to support the hypothesis. Interestingly, the effect on social influence was close to significant, and the univariate test on RA15, the most valid item, was significant ($F=5.47$, $P< .02$).

The second hypothesis was that heterogeneity and homogeneity of individual feedback would affect felt social influence and

cohesiveness. Heterogeneity was expected to generate higher influence, but lower cohesiveness than homogeneity. This hypothesis was tested by examining the main effect for individual feedback pattern. This effect was significant for cohesiveness (Wilks = 0.859; $P < .021$) but not significant for social influence. A further contrast was made on the cohesiveness measure by recording feedback as heterogeneous or homogeneous. This contrast was also significant (Wilks = 0.913; $P < .007$). The conditional mean of RA2, the item most highly correlated with the canonical variate was examined for directionality. Mean cohesiveness proved to be greater for the homogeneous case, thus supporting the hypothesis.

The third hypothesis was that negative group feedback would create stronger felt social influence. An examination of the main effect for group feedback does not support this hypothesis.

The fourth hypothesis predicted a group by individual pattern by individual feedback interaction. This hypothesis was investigated for models A and B, but was not supported. The failure to support suggests that "minority effects" did not occur.

The fifth hypothesis was that the simple presentation of group feedback would enhance cohesiveness, and that positive group feedback would further enhance it. The main effect of group feedback on cohesiveness was not significant.

The sixth hypothesis was that group feedback and feedback pattern would interact so that negative group feedback would create devisiveness when individual feedback was heterogeneous.

This hypothesis would suggest a two way interaction between the feedback types. None of the models produced such an interaction.

There were several significant unhypothesized effects on the cohesiveness measure. Specifically, models A and C (i.e., the models using all the data) produced style by group feedback interactions. A diagram of the conditional means for item Ra 16, the item most highly correlated with the canonical variable, is presented in Figure IV-2. The interaction indicates when style is participative, negative feedback has little impact on cohesiveness. When the style was to impose a change, however, negative group feedback increased cohesiveness. A possible interpretation of this effect is that negtive group feedback produces a defensive response and a more "tightly-knit" group. This effect would be similar to effects of adversity on liking found in prior social psychological literature. When the behavior was introduced participatively, however, negative group feedback was probably viewed more as a group failure.

The other unhypothesized effects on cohesiveness were a three way interaction among the feedback conditions, and a four way interaction, both in model B. A discussion of the four way interaction is most enlightening in this case, and the conditional means for Ra 20, the best explanatory item for this interaction, are diagramed in Figure IV-3. Following participation, an individual receiving positive individual feedback when the rest of the group receives individual negative feedback, reports more cohesiveness when the group does poorly than when it succeeds.

This trend is the opposite in all other feedback conditions following participation. This entire pattern is reversed in the imposed style condition. An interpretation of this pattern is that participation creates a "team feeling" so that the sole successful member of a well performing group feels some conflict and inequity. These feelings do not occur following an imposed intervention.

# V. Conclusions

Ignoring, for the present, the specific hypotheses, this study attempted to discover the main and interactive impact of participative interventions, individual performance feedback and group performance feedback on behaviors, beliefs and other social indicators in a simulated planned change context. The resultant data point to an array of conclusions, some which were anticipated and some which were unexpected. This section of the report summarized those conclusions notes the limitations of this research and outlines some future directions.

There are five generally conclusions:

1. Behaviors and intentions about behavior are modified by intervention style, feedback about individual performance and feedback about group performance. These modifications are attributable to both main and interactive effects.

2. The value associated with a particular performance outcome is affected by the information available about those outcomes and other performance outcomes.

3. The cohesiveness of a work group in the change context varies according to interactions between intervention style and the various feedback patterns.

4. Perceived social influence in a work group undergoing change was not significantly affected by the manipulated factors.

5. The manipulation of participation was related to increases in perceived input, responsibility, committment and beliefs about benefits regarding job rotation, but decreases in perceived choice over alternative modes of action.

The conclusions with regard to behaviors were generally consistent with the hypotheses with several exceptions. First, style did not affect actual behavior. This was somewhat surprising given the positive effect of style on beliefs about the benefits of rotation. Some caution is necessary in interpreting this result because of the small number of groups per cell and uncorrectable heterogeneity of variance (i.e., several cells had no rotation , hence no variance). Another unexpected result was the three way interaction of style, group and individual feedback in which the effect of positive group feedback was strongly alternated by the presentation of individual feedback in the participative condition. This result clearly suggests that persistence is most likely for rotation when positive group feedback follows a participative intervention.

The effect of the independent variables on valence was somewhat less powerful than anticipated. The simple presence or absence of feedback did little to enhance outcome valences. The only exception to this was the presentation of individual feedback which raised the valence of group performance and lowered that of individual performance. This effect was particularly evident when group feedback was not negative. This result was at variance with the hypothesized relationship between the presentation of feedback about a performance outcome and its salience or value to individuals. The results seem to suggest the scenario that mixed (i.e., + and -) feedback to a group generates discomfort or inequities hence group performance becomes more salient.

The effects on the cohesiveness measure were also less powerful than expected. Style had no effect. Heterogeneity of individual feedback created less cohesiveness and negative group feedback, when coupled with participative style, created higher cohesiveness, perhaps as a defensive response. Also, feelings of inequity raised by particular patterns of style, individual and group feedback may also affect reported cohesiveness.

The absence of effects on social influence may have reflected one of two states. First, intervention style and feedback may not have an impact on felt social influence. Alternatively, the scale was not reliable or valid, hence social influence was not properly assessed. Clearly additional research is necessary to solve this dilemma.

Finally, the array of manipulation checks on style revealed some interesting characteristics of participation. As expected, it increased feelings of responsibility for and committment to the new behavior. Unexpectedly, however, it decreased perceptions of having a choice about alternatives and had mixed results on feelings about group consensus. This result suggests that participation in a group context may impose restrictions on choice; that is, individuals may feel more compelled to adhere to the group's wishes and, hence, since less individual choice.

The practical implications of the findings rest in the design of organizational change efforts. The field of planned change has been and will continue to be focused on the development of technologies for successfully implementing changes in

organizational functioning. It has been argued that behavior change is at the basis of any such effort. At present, these technologies are largely based on psychological and social-psychological theory which may or may not be generalizable to organizational contexts. As noted earlier, there is a paucity of research directly examining behavior processes and their cognitive counterparts in organizational change contexts. The present study simulated such a context in an attempt to more precisely examine the implications of several facets of well accepted technologies. Given such a goal, several implications can be drawn from this study for the design of change technologies.

First, there may be certain interdependencies between the style in which a new behavior is introduced and feedback about the behavior which have implications for creating persistence. This study suggests that the efficacy of group feedback is enhanced by the participative style of introducing change. This clearly has implications for the kind of information that should be provided following participative interventions.

Secondly, the study showed that group and individual feedback interacted. In some cases, the efficacy of one type of feedback was enhanced or diminished by the presentation of the other type, in other cases effic attenuated. Again, interactions should be considered. It is particularly noteworthy that the psychological literature is lacking in studies examining feedback in group contexts and in studies comparing group versus individualized feedback. Group situations in organizations, however, are more the rule than the exception.

Finally, the manipulations in this study affected group process variables. The notion that interventions may increase group cohesiveness has implications for norm formation and the institutionalization of new forms of work behavior.

Limitations of the Study

This study was limited in several ways. First, as in all studies, only a limited number of variables were controllable or measurable. Care is necessary in generalizing the results to all organizational contexts. Of particular importance is the technology or task of the change participants. In this study, the task implied some degree of mutual fate control or interdependency. Such interdependencies may moderate the efficacy of style and feedback for changing behaviors and beliefs. In a less interdependent task, group feedback may have been for less salient. A similar case could be made for task as a moderator of the cohesiveness effects.

A second limitation of the study was the relationship between behavior and feedback. The feedback received by a subject was usually contingent on the behavior of his/her group. Hence when investigating the effect of feedback on beliefs, it was generally not possible to isolate the feedback from prior behavior. From a conceptual perspective, the separation of these effects is appealing. In reality, however, they may always covary. In any case, it is important to recognize that both feedback and behavior patterns are correlated in the study and that each, alone, could account for portions of the effect.

Another obvious limitation was the artificiality of the context. Clearly, subjects are not life time employees. Similarly, ten trials is probably not an accurate representation of a lifetime of doing things a certain way, hence resistence to adoption may have been minimal. Again, generalizations require care.

Finally, the manipulation of participation in the study varied in efficacy, yet this was not accounted for in the analysis. Some groups generated a number of ideas for changing behavior during the participative intervention. Others generated none. Some groups were enthusiastic about adopting rotation, others were not. The factorial design of the study necessitated classifying all of these as equally participative. Further analysis should be performed to account for degree of particpation.

Further Research

This report represented only a part of the analysis possible on these data. The present analyses are sufficient to examine the proposed hypotheses. The results, to date, however, create further questions which may, in part, be examined in an exploratory sense using the current data. For example, one issue concerns whether the process measures can be aggregated to the group level and, if so, how will the manipulations affect the aggregate. A second issue concerns the potential of analysis of covariance for separating the effects of feedback and behavior on the behavioral intention and the other attitudinal measures. In addition to such issues, the study also suggests additional studies.

One such study might examine the effect of task and intervention types on the effects of the variables manipulated in the present studies. Less interdependent tasks and intervention behaviors may result in lowered efficacy of group feedback fewer social influence effects and the elimination of the effects of the independent variables on cohesiveness.

A second research issue fomented by the study is the impact of participation on cognitive states in group contexts. For example, in this study participation reduced perceived choice on the average. One can conceive of circumstances where the opposite effect might occur. Such conditions should be identified and investigated.

A final issue of note is the importance of social influence in the entire process of persistence of group activities. This study did not attempt to investigate the specific role of member personalities, status structures or opinion leaders on group behavior. Yet it was clear from casual observations of groups engaged in the study that such factors were critical.

Table III - 1

Individual Feedback Schedules

First Ten Trials

| Trial # | Player 1 | Player 2 | Player 3 |
|---|---|---|---|
| 1 | 73 - | 60 + | 80 - |
| 2 | 58 - | 33 + | 65 - |
| 3 | 42 + | 51 - | 38 + |
| 4 | 39 - | 43 - | 28 + |
| 5 | 26 + | 37 - | 39 - |
| 6 | 23 + | 34 - | 28 + |
| 7 | 26 + | 28 + | 40 - |
| 8 | 37 - | 21 + | 31 + |
| 9 | 31 + | 37 - | 23 + |
| 10 | 34 - | 21 + | 30 - |

Remaining Trials, Negative Feedback:

| Trial # | Player 1 - | Player 2 - |
|---|---|---|
| 11 | 26 - | 33 - |
| 12 | 29 - | 35 - |
| 13 | 32 - | 35 - |
| 14 | 30 - | 35 - |
| 15 | 29 - | 33 - |
| 16 | 16 - | 36 - |
| 17 | 28 - | 31 - |
| 18 | 31 - | 14 + |
| 19 | 27 - | 34 - |
| 20 | 32 - | 33 - |
| 21 | 30 - | 31 - |

Remaining Trials, Positive Feedback:

Player #1

| Trial # | Feedback | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 11 | 33 - | | | | | | | | | | |
| 12 | 26 + | 31 | | | | | | | | | |
| 13 | 19 + | 24 | 30 | | | | | | | | |
| 14 | 16 + | 22 | 27 | 31 | | | | | | | |
| 15 | 18 + | 25 | 30 | 31 | 33 | | | | | | |
| 16 | 13 - | 20 | 26 | 30 | 33 | 36 | | | | | |
| 17 | 8 - | 15 | 22 | 30 | 33 | 36 | 31 | | | | |
| 18 | 11 + | 17 | 24 | 30 | 33 | 36 | 31 | 32 | | | |
| 19 | 7 + | 17 | 24 | 30 | 33 | 36 | 31 | 32 | 34 | | |
| 20 | 13 + | 19 | 26 | 30 | 33 | 36 | 31 | 32 | 34 | 33 | |
| 21 | 11 + | 17 | 24 | 30 | 33 | 36 | 31 | 32 | 34 | 33 | 31 |

"-" moving right
"+" moving left

Table III - 1 (continued)

Player #2

| Trial # | Feedback | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 11 | 26 - | | | | | | | | | | |
| 12 | 23 + | 29 | | | | | | | | | |
| 13 | 16 + | 23 | 30 | | | | | | | | |
| 14 | 14 + | 22 | 30 | 30 | | | | | | | |
| 15 | 15 + | 22 | 30 | 30 | 29 | | | | | | |
| 16 | 7 + | 15 | 20 | 25 | 29 | 36 | | | | | |
| 17 | 11 + | 17 | 22 | 30 | 29 | 36 | 28 | | | | |
| 18 | 14 + | 20 | 25 | 30 | 29 | 36 | 28 | 31 | | | |
| 19 | 7 + | 15 | 22 | 27 | 29 | 36 | 28 | 31 | 27 | | |
| 20 | 7 + | 15 | 22 | 27 | 29 | 36 | 28 | 31 | 27 | 32 | |
| 21 | 6 + | 15 | 22 | 27 | 29 | 36 | 28 | 31 | 27 | 32 | 30 |

"-" moving right
"+" moving left

Player #3

| Trial # | Feedback | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 11 | 30 - | | | | | | | | | | |
| 12 | 25 + | 30 | | | | | | | | | |
| 13 | 18 + | 23 | 28 | | | | | | | | |
| 14 | 19 + | 24 | 29 | 34 | | | | | | | |
| 15 | 16 + | 21 | 26 | 34 | 30 | | | | | | |
| 16 | 14 + | 19 | 24 | 34 | 30 | 35 | | | | | |
| 17 | 12 + | 17 | 22 | 34 | 30 | 35 | 30 | | | | |
| 18 | 9 + | 17 | 23 | 27 | 30 | 35 | 30 | 34 | | | |
| 19 | 9 + | 17 | 23 | 27 | 30 | 35 | 30 | 34 | 30 | | |
| 20 | 11 + | 13 | 18 | 23 | 30 | 35 | 30 | 34 | 30 | 31 | |
| 21 | 8 + | 13 | 18 | 23 | 30 | 35 | 30 | 34 | 30 | 31 | 32 |

Table III - 2

Group Feedback Schedules

First 10 Trials:

| Trial | Feedback |
|---|---|
| 1 | 71 - |
| 2 | 52 + |
| 3 | 43 + |
| 4 | 37 - |
| 5 | 34 - |
| 6 | 28 + |
| 7 | 31 - |
| 8 | 29 + |
| 9 | 30 - |
| 10 | 28 + |

Remaining Trails:

+ Feedback

| Trial # | Group | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 11 | 27 - | | | | | | | | | | |
| 12 | 26 + | 29 | | | | | | | | | |
| 13 | 22 + | 26 | 30 | | | | | | | | |
| 14 | 21 + | 25 | 30 | 31 | | | | | | | |
| 15 | 22 + | 24 | 28 | 31 | 29 | | | | | | |
| 16 | 12 + | 17 | 20 | 25 | 25 | 29 | | | | | |
| 17 | 17 + | 21 | 24 | 31 | 29 | 33 | 29 | | | | |
| 18 | 18 + | 23 | 26 | 29 | 30 | 23 | 30 | 32 | | | |
| 19 | 14 + | 20 | 24 | 27 | 29 | 33 | 28 | 31 | 28 | | |
| 20 | 17 + | 20 | 24 | 27 | 30 | 35 | 31 | 32 | 30 | 32 | |
| 21 | 15 + | 19 | 23 | 27 | 30 | 34 | 29 | 32 | 29 | 31 | 31 |

If group begins switching again, jump back to dotted line and begin plussing.

- Feedback

| Trial # | Group | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 11 | 27 - | | | | | | | | | | |
| 12 | 26 - | 29 | | | | | | | | | |
| 13 | 22 - | 26 | 30 | | | | | | | | |
| 14 | 21 - | 25 | 30 | 31 | | | | | | | |
| 15 | 22 - | 24 | 28 | 31 | 29 | | | | | | |
| 16 | 12 - | 17 | 20 | 25 | 25 | 29 | | | | | |
| 17 | 17 - | 21 | 24 | 31 | 29 | 33 | 29 | | | | |
| 18 | 18 - | 23 | 26 | 29 | 30 | 34 | 30 | 32 | | | |
| 19 | 14 - | 20 | 24 | 27 | 29 | 33 | 28 | 31 | 28 | | |
| 20 | 17 - | 20 | 24 | 27 | 30 | 35 | 31 | 32 | 30 | 32 | |
| 21 | 15 - | 19 | 23 | 27 | 30 | 34 | 29 | 32 | 29 | 31 | 31 |

Table III - 3

Manipulation Assessment Items[1]

| Item # | Item |
|---|---|
| | **Perceived Choice** |
| RA 7 | Our group had a clear choice about which work procedure to adopt. |
| RA 28 | I feel free to experiment with a variety of decision making procedures. |
| | **Perceived Input** |
| RA 13 | When it came time to consider new ways of performing the task, the members of my team all had an opportunity to make suggestions. |
| | **Responsibility** |
| RA 11 | I felt some responsiblity for the choice of job rotation at the time we decided to try it as a work procedure. |
| | **Consensus** |
| RA 8 | There was a strong agreement among the members of our group that adopting the new behavior of rotating tasks was a good idea. |
| RA 19 | There was some disagreement in my group about our initial choice to adopt job rotation as a work procedure. |
| | **Committment** |
| RA 32 | After my team adopted the new work procedure, I felt committed to the continued use of the procedure. |
| RA 46 | I felt it was very important to try to make the job rotation procedure succeed. |
| | **Initial Beliefs about Rotation** |
| RA 14 | When we first decided to try it, I felt that rotating tasks would improve performance. |

[1] Each item was followed by a six-point Likert type scale ranging from 1 = extremely important to 6 = extremely unimportant.

Table III - 4

Valence Items

Subjects were asked to rate the following performance outcomes[1]

| Item # | Item |
|---|---|
| RC 1 | The performance of the team as a whole. |
| RC 4 | The importance of the team as a whole for receiving a bonus. |
| RC 3 | Your own individual performance. |
| RC 6 | The importance of your own individual performance for receiving a bonus. |

[1] Each outcome was followed by a six point Likert type scale ranging from 1 = extremely important to 6 = extremely unimportant.

Table III - 5

Cohesiveness Items[1]

| Item # | Item |
|---|---|
| | Liking for the Group |
| RA 1 | The other members of my team would make good friends. |
| RA 20 | Generally speaking, I did not like the other members of my group. |
| RA 24 | I would feel very comfortable interacting with the other members of my team in social situations. |
| | Group Identity |
| RA 4 | I had a strong sense of belonging to my team. |
| RA 22 | My team seemed to generate a real identity. |
| RA 16 | Comparing with other groups I have belonged to, our team was very good at sticking together. |
| | Stay or Remain |
| RA 17 | If given the opportunity to continue working with the members of this group or to switch, I would switch. |
| RA 30 | If the other members of this group decided to disband the team, I would try to pursuade them not to. |
| RA 33 | It is likely that I would be more satisfied belonging to another team. |
| | Miscellaneous Items |
| RA 2 | The success of our team was more important to me than my own individual success. |
| RA 25 | Our team was more like a closely-knit family than a group of individual performances. |

[1] Each of these statements was followed by a six-point Likert type scale ranging from "strongly disagree" to "strongly agree".

Table III - 6

Social Influence Items[1]

| Item # | Item |
|---|---|
| RA 15 | The individual members of my team did not try to make other individual members to conform to their wishes. |
| RA 31 | My team would very likely criticize me for not doing things their way. |
| RA 6 | The other members of my team seemed quite concerned about whether or not I rotated tasks. |
| RA 40 | There were strong pressures in my group to conform with the desires of the majority about work procedures. |

[1] Each of these statements was followed by a six-point Likert type scale ranging from "strongly disagree" to "strongly agree".

Table IV - 1

Effects of Intervention Style in Experimental Manipulation Items

| UNIVARIATE ITEM # | ITEM CONTENT | MS | MSE | F | sig | CORRELATION WITH CANONICAL COMPOSITE |
|---|---|---|---|---|---|---|
| RA7 | Perceived Choice | 7.84 | 2.13 | 3.67 | .056 | .243 |
| RA28 | Perceived Choice | 3.79 | 1.30 | 2.91 | .089 | .216 |
| RA13 | Perceived Input | 10.01 | 0.94 | 10.68 | .001 | -.415 |
| RA11 | Responsibility | 10.40 | 1.65 | 6.29 | .013 | -.319 |
| RA8 | Consensus about Rotation | 52.45 | 1.91 | 27.52 | .000 | -.666 |
| RA19 | Consensus about Rotation | 9.25 | 1.55 | 5.95 | .015 | .309 |
| RA32 | Commitment to Rotation | 0.00 | 1.69 | 0.00 | .963 | -.006 |
| RA46 | Commitment to Rotation | 4.28 | 1.49 | 2.88 | .091 | -.215 |
| RA14 | Initial Beliefs About Rotation Improving Performance | 25.51 | 1.94 | 13.13 | .000 | -.460 |

MULTIVARIATE (S=1, M=3.5, N=73)

| TEST | VALUE | APPROX F | HYPOTHESIS D.F. | ERROR D.F. | sig. |
|---|---|---|---|---|---|
| Pillais | .198 | 6.67 | 9.00 | 244.00 | .000 |
| Hotellings | .246 | 6.67 | 9.00 | 244.00 | .000 |
| Wilks | .802 | 6.67 | 9.00 | 244.00 | .000 |

Table IV - 2

Means and Standard Deviations of
Manipulation Check Items for Feedback
(N=270; 15/cell)

| Experimental Conditions | | | Item Re 3 Learning Value of Feedback | | Item Re 6 Accuracy of Feedback | | Item Re 8 General Suspicion | |
|---|---|---|---|---|---|---|---|---|
| Inter. Style | Group Fdbk. | Ind. Fdbk. Pattern | $\bar{X}$ | S.D. | $\bar{X}$ | S.D. | $\bar{X}$ | S.D. |
| Imp. | none | none | 3.47 | 1.55 | 2.87 | 1.85 | 3.67 | 1.72 |
| Imp. | none | −−+ | 3.93 | 1.62 | 4.00 | 1.20 | 3.93 | 1.10 |
| Imp. | none | −++ | 4.00 | 1.51 | 4.00 | 1.00 | 3.73 | 0.96 |
| Imp. | − | none | 4.13 | 1.13 | 4.07 | 1.49 | 3.47 | 1.41 |
| Imp. | − | −−+ | 3.93 | 1.10 | 3.40 | 1.45 | 4.27 | 1.53 |
| Imp. | − | −++ | 3.80 | 1.21 | 4.20 | 1.26 | 3.47 | 1.55 |
| Imp. | + | none | 4.80 | 0.68 | 4.27 | 1.33 | 3.73 | 1.33 |
| Imp. | + | −−+ | 3.53 | 1.60 | 3.33 | 1.29 | 3.87 | 1.41 |
| Imp. | + | −++ | 4.53 | 0.99 | 3.13 | 1.13 | 4.47 | 1.19 |
| Part. | none | none | 3.33 | 1.35 | 4.00 | 1.13 | 3.00 | 1.51 |
| Part. | none | −−+ | 3.53 | 1.06 | 3.80 | 1.01 | 3.33 | 1.23 |
| Part. | none | −++ | 3.87 | 1.25 | 4.13 | 0.74 | 3.67 | 1.11 |
| Part. | − | none | 3.93 | 1.49 | 3.60 | 1.40 | 3.53 | 1.68 |
| Part. | − | −−+ | 4.00 | 1.00 | 4.00 | 1.25 | 4.13 | 1.36 |
| Part. | − | −++ | 4.80 | 0.86 | 4.00 | 0.93 | 3.80 | 1.32 |
| Part. | + | none | 4.20 | 1.08 | 3.67 | 1.17 | 3.87 | 1.41 |
| Part. | + | −−+ | 4.40 | 0.99 | 3.33 | 1.29 | 4.07 | 1.62 |
| Part. | + | −++ | 4.47 | 0.99 | 4.20 | 1.21 | 3.20 | 1.51 |
| FOR ENTIRE SAMPLE | | | 4.04 | 1.25 | 3.78 | 1.27 | 3.73 | 1.41 |

Table IV - 3

Correlations Between the Semantic Differential Items and the Process Measure Items
(N=300)

| Process Items | Semantic Differential Items: Cohesive | Silent | Argumentative | Peaceful | High-Pressure |
|---|---|---|---|---|---|
| **Cohesiveness Items** | | | | | |
| RA 1 | .09 * | | | | |
| RA 20 | .13 ** | | | | |
| RA 24 | .05 | | | | |
| RA 4 | .03 | | | | |
| RA 22 | .12 ** | | | | |
| RA 16 | .13 ** | | | | |
| RA 17 | .11 ** | | | | |
| RA 30 | .14 ** | | | | |
| RA 33 | .09 * | | | | |
| RA 2 | .14 ** | | | | |
| RA 25 | .02 | | | | |
| **Influence Items** | | | | | |
| RA 15 | | -.08 | .15 ** | -.17 ** | .14 ** |
| RA 31 | | -.03 | .03 | -.06 | .05 |
| RA 6 | | -.05 | -.15 ** | -.07 | .10 * |
| RA 40 | | .02 | -.03 | .04 | .04 |

* denotes $P < .1$

** denotes $P < .05$

Table IV - 4

Mean Rotation by Experimental Condition

Conditions

| Style | Group Fdbk. | Ind. Fdbk. Patrn. | Rotation Frequency mean | Rotation Frequency std. dev. | Consecutive Rotations mean | Consecutive Rotations std. dev. | N |
|---|---|---|---|---|---|---|---|
| imposed | none | none | 1.8 | 3.0 | 1.8 | 3.0 | 5 |
| imposed | none | --+ | 0.0 | 0.0 | 0.0 | 0.0 | 5 |
| imposed | none | +++ | 1.0 | 1.4 | 0.8 | 1.1 | 5 |
| imposed | - | none | 2.2 | 2.5 | 1.4 | 2.6 | 5 |
| imposed | - | --+ | 0.0 | 0.0 | 0.0 | 0.0 | 5 |
| imposed | - | -++ | 0.8 | 0.8 | 0.0 | 0.0 | 5 |
| imposed | + | none | 5.4 | 2.6 | 4.6 | 3.4 | 5 |
| imposed | + | --+ | 0.0 | 0.0 | 0.0 | 0.0 | 5 |
| imposed | + | -++ | 2.2 | 2.9 | 1.8 | 3.0 | 5 |
| partic. | none | none | 3.0 | 3.7 | 3.0 | 3.7 | 5 |
| partic. | none | --+ | 0.0 | 0.0 | 0.0 | 0.0 | 5 |
| partic. | none | -++ | 0.4 | 0.5 | 0.0 | 0.0 | 5 |
| partic. | - | none | 2.0 | 2.9 | 1.4 | 3.1 | 5 |
| partic. | - | --+ | 0.4 | 0.9 | 0.2 | 0.4 | 5 |
| partic. | - | -++ | 1.0 | 2.2 | 0.4 | 0.9 | 5 |
| partic. | + | none | 5.8 | 2.7 | 5.6 | 3.1 | 5 |
| partic. | + | --+ | 3.4 | 2.3 | 1.8 | 3.0 | 5 |
| partic. | + | -++ | 2.6 | 3.2 | 2.6 | 3.2 | 5 |
| Overall | | | 1.8 | 2.6 | 1.4 | 2.6 | 90 |

Table IV - 5

Anova's for Behavioral Measures (Model A)

A. For Frequency of Rotation

| Source | SS | df | MS | F | sig'N |
|---|---|---|---|---|---|
| Style (A) | 7.51 | 1 | 7.51 | 1.61 | .208 |
| Group Fdbk. (B) | 95.36 | 2 | 47.68 | 10.22 | .000 |
| Ind. Fdk. Pat'rn. (C) | 120.96 | 2 | 60.48 | 12.96 | .000 |
| A x B | 7.62 | 2 | 3.81 | 0.82 | .446 |
| A x C | 6.16 | 2 | 3.08 | 0.65 | .520 |
| B x C | 14.44 | 4 | 3.61 | 0.77 | .546 |
| A x B x C | 13.51 | 4 | 3.37 | 0.72 | .578 |
| Error | 336.00 | 72 | 4.67 | | |
| Total | 601.56 | 89 | | | |

B. For Consectutive Rotations

| Source | SS | df | MS | F | sig'N |
|---|---|---|---|---|---|
| Style (A) | 5.88 | 1 | 5.88 | 1.16 | .285 |
| Group Fdbk. (B) | 80.69 | 2 | 40.34 | 7.95 | .001 |
| Ind. Fdbk. Pat'rn. (C) | 114.29 | 2 | 57.15 | 11.26 | .000 |
| A x B | 5.36 | 2 | 2.68 | 0.53 | .592 |
| A x C | 1.62 | 2 | 0.81 | 0.16 | .853 |
| B x C | 21.71 | 4 | 5.42 | 1.07 | .378 |
| A x B x C | 5.04 | 4 | 1.26 | 0.25 | .910 |
| Error | 365.20 | 72 | 5.07 | | |
| Total | 599.79 | 89 | | | |

Table IV - 6

Mean Behavioral Intention be Experimental Condition

| Style | Condition: Group Fdbk. | Condition: Ind. Fdbk. Patr'n | Condition: Ind. Fdbk. | Behavioral Intention: Mean | Behavioral Intention: Std. Dev. | N |
|---|---|---|---|---|---|---|
| imposed | none | none | none | 5.6 | 3.0 | 15 |
| imposed | none | --+ | - | 2.7 | 1.8 | 10 |
| imposed | none | --+ | + | 5.2 | 3.3 | 5 |
| imposed | none | -++ | - | 3.8 | 3.4 | 5 |
| imposed | none | -++ | + | 4.7 | 2.6 | 10 |
| imposed | - | none | none | 4.8 | 2.7 | 15 |
| imposed | - | --+ | - | 3.2 | 3.2 | 10 |
| imposed | - | --+ | + | 1.8 | 1.8 | 5 |
| imposed | - | -++ | - | 3.2 | 1.6 | 5 |
| imposed | - | -++ | + | 5.5 | 2.4 | 10 |
| imposed | + | none | none | 9.6 | 0.7 | 15 |
| imposed | + | --+ | - | 5.1 | 3.3 | 10 |
| imposed | + | --+ | + | 4.0 | 1.9 | 5 |
| imposed | + | -++ | - | 2.4 | 2.3 | 5 |
| imposed | + | -++ | + | 4.7 | 3.3 | 10 |
| partic. | none | none | none | 6.5 | 2.8 | 15 |
| partic. | none | --+ | - | 4.0 | 1.9 | 10 |
| partic. | none | --+ | + | 4.2 | 1.3 | 5 |
| partic. | none | -++ | - | 4.2 | 3.0 | 5 |
| partic. | none | -++ | + | 6.3 | 2.9 | 10 |
| partic. | - | none | none | 7.1 | 2.5 | 15 |
| partic. | - | --+ | - | 4.0 | 2.4 | 10 |
| partic. | - | --+ | + | 6.0 | 3.7 | 5 |
| partic. | - | -++ | - | 3.6 | 2.6 | 5 |
| partic. | - | -++ | + | 4.9 | 3.2 | 10 |
| partic. | + | none | none | 9.2 | 0.9 | 15 |
| partic. | + | --+ | - | 6.3 | 4.0 | 10 |
| partic. | + | --+ | + | 8.6 | 0.5 | 5 |
| partic. | + | -++ | - | 5.0 | 2.5 | 5 |
| partic. | + | -++ | + | 8.2 | 1.8 | 10 |
| | Overall | | | 5.6 | 3.1 | 270 |

Table IV - 7

ANOVA's For Behavior Intention (All Models)

A. Model A

| Source | SS | df | MS | F | sig'N |
|---|---|---|---|---|---|
| Style (A) | 116.03 | 1 | 116.03 | 16.6 | .000 |
| Group Fdbk. (B) | 263.60 | 2 | 131.03 | 18.9 | .000 |
| Ind. Fdbk. Patr'n. (C) | 357.43 | 2 | 178.71 | 25.5 | .000 |
| A x B | 7.62 | 2 | 3.81 | .5 | .580 |
| A x C | 4.82 | 2 | 2.41 | .3 | .709 |
| B x C | 71.24 | 4 | 17.81 | 2.5 | .039 |
| A x B x C | 79.22 | 4 | 19.80 | 2.8 | .025 |
| Error | 1760.80 | 252 | 6.99 | | |
| Total | 2776.79 | 269 | | | |

B. Model B

| Source | SS | df | MS | F | sig'N |
|---|---|---|---|---|---|
| Style (A) | 97.20 | 1 | 97.20 | 12.25 | .001 |
| Group Fdbk. (B) | 73.63 | 1 | 73.63 | 9.23 | .003 |
| Ind. Fdbk. Patr'n. (C) | 2.13 | 1 | 2.13 | 0.27 | .605 |
| Ind. Fdbk. (D) | 49.50 | 1 | 49.50 | 6.24 | .014 |
| A x B | 28.03 | 1 | 28.03 | 3.53 | .063 |
| A x C | 3.33 | 1 | 3.33 | 0.42 | .518 |
| A x D | 18.70 | 1 | 18.70 | 2.36 | .127 |
| B x C | 12.03 | 1 | 12.03 | 1.52 | .221 |
| B x D | 2.60 | 1 | 2.60 | 0.33 | .568 |
| C x D | 22.20 | 1 | 22.20 | 2.80 | .097 |
| A x B x C | 17.63 | 1 | 17.63 | 2.22 | .139 |
| A x B x D | 1.50 | 1 | 1.50 | 0.19 | .664 |
| A x C x D | 19.84 | 1 | 19.84 | 2.30 | .117 |
| B x C x D | 0.70 | 1 | 0.70 | 0.09 | .766 |
| A x B x C x D | 1.50 | 1 | 1.50 | 0.19 | .664 |
| Error | 824.90 | 104 | 7.93 | | |
| Total | 1175.42 | 112 | | | |

C. Model C

| Source | SS | df | MS | F | sig'N |
|---|---|---|---|---|---|
| Style (A) | 170.25 | 1 | 170.25 | 25.47 | .000 |
| Group Fdbk. (B) | 297.86 | 2 | 148.93 | 22.28 | .000 |
| Ind. Fdbk. (C) | 434.00 | 2 | 217.14 | 32.49 | .000 |
| A x B | 19.82 | 2 | 9.91 | 1.48 | .229 |
| A x C | 19.47 | 2 | 9.73 | 1.46 | .234 |
| B x C | 51.11 | 4 | 12.78 | 1.91 | .109 |
| A x B x C | 73.03 | 4 | 18.26 | 2.73 | .029 |
| Error | 1884.83 | 282 | 6.68 | | |
| Total | 2950.37 | 299 | | | |

Table IV - 8

MANOVA on the Valence Items (Model A)

A. MANOVA Table

| Source | Wilks Lambda | Approx. F. | df | sig'N |
|---|---|---|---|---|
| Style (A) | .979 | 1.34 | 4,249 | .254 |
| Group Fdbk. (B) | .973 | 0.864 | 8,498 | .546 |
| Ind. Fdbk. Patr'n. (C) | .927 | 2.39 | 8,498 | .015 |
| A x B | .984 | 0.502 | 8,498 | .855 |
| A x C | .981 | 0.572 | 8,498 | .801 |
| B x C | .900 | 1.67 | 16,761 | .048 |
| A x B x C | .947 | 0.85 | 16,761 | .629 |

B. Correlations of the Measures With the Canonical Variate and Univariate F Tests for the Individual Feedback Effect

| Items | | Canonical Variate | Univariate ANOVA F | sig'N |
|---|---|---|---|---|
| group outcome valence | | | | |
| | RC1 | -.57 | 3.46 | 0.03 |
| | RC4 | -.25 | 0.92 | 0.40 |
| individual outcome valence | | | | |
| | RC3 | -.06 | 0.025 | 0.97 |
| | RC6 | .37 | 2.035 | 0.13 |

C. Correlation of the Measures With the Canonical Variate and Univariate F Tests for the B x C Interaction

| Items | | Canonical Variate | Univariate ANOVA F | sig'N |
|---|---|---|---|---|
| group outcome valences | | | | |
| | RC1 | -.57 | 1.43 | 0.022 |
| | RC4 | -.74 | 3.25 | 0.013 |
| individual outcome valences | | | | |
| | RC3 | -.37 | 0.89 | 0.47 |
| | RC6 | -.00 | 1.69 | 0.15 |

Table IV - 9

Analyses of Influence Measures (All Models)

A. Model A

| Source | Wilks Lambda | Approx. F | df | sig'N |
|---|---|---|---|---|
| Style (A) | .968 | 2.07 | 4,249 | .085 |
| Group Fdbk(B) | .950 | 1.295 | 8,498 | .244 |
| Ind. Fdbk. Patr'n. (C) | .985 | 0.472 | 8,498 | .876 |
| A x B | .977 | 0.710 | 8,498 | .683 |
| A x C | .956 | 1.413 | 8,498 | .188 |
| B x C | .940 | 0.968 | 16,761.35 | .490 |
| A x B x C | .942 | 0.938 | 16,761.35 | .525 |

B. Model B

| Source | Wilks Lambda | Approx. F | df | sig'N |
|---|---|---|---|---|
| Style (A) | .973 | 0.683 | 4,101 | .606 |
| Group Fdbk. (B) | .968 | 0.821 | 4,101 | .514 |
| Ind. Fdbk. Patr'n (C) | .982 | 0.451 | 4,101 | .771 |
| Ind. Fdbk. (D) | .985 | 0.376 | 4,101 | .825 |
| A x B | .955 | 1.175 | 4,101 | .326 |
| A x C | .939 | 1.631 | 4,101 | .172 |
| A x D | .952 | 1.286 | 4,101 | .281 |
| B x C | .976 | 0.620 | 4,101 | .649 |
| B x D | .969 | 0.814 | 4,101 | .519 |
| C x D | .969 | 0.803 | 4,101 | .526 |
| A x B x C | .972 | 0.737 | 4,101 | .569 |
| A x B x D | .990 | 0.246 | 4,101 | .911 |
| A x C x D | .912 | 2.441 | 4,101 | .051 |
| B x C x D | .956 | 1.168 | 4,101 | .330 |
| A x B x C x D | .996 | 0.111 | 4,101 | .978 |

C. Model C

| Source | Wilks Lambda | Approx. F | df | sig'N |
|---|---|---|---|---|
| Style (A) | .979 | 1.529 | 4,279 | .194 |
| Group Fdbk. (B) | .964 | 2.286 | 8,558 | .248 |
| Ind. Fdbk. (C) | .983 | 9.615 | 8,558 | .766 |
| A x B | .967 | 1.181 | 8,558 | .308 |
| A x C | .952 | 1.730 | 8,558 | .099 |
| B x C | .942 | 1.060 | 16,852.99 | .390 |
| A x B x C | .961 | .696 | 16,852.99 | .800 |

Table IV - 10

Analyses of Cohesiveness Measures (All Models)

A. Model A

| Source | Wilks Lambda | Approx. F | dF | sig'N |
|---|---|---|---|---|
| Style (A) | .961 | 0.882 | 11,242 | .558 |
| Group Fdbk. (B) | .879 | 1.465 | 22,484 | .080 |
| Ind. Fdbk. Patr'n. (C) | .859 | 1.734 | 22,484 | .021 |
| A x B | .858 | 1.753 | 22,484 | .019 |
| A x C | .895 | 1.251 | 22,484 | .199 |
| B x C | .835 | 1.019 | 44,927 | .440 |
| A x B x C | .850 | 0.916 | 44,927 | .629 |

B. Model B

| Source | Wilks Lambda | Approx. F | dF | sig'N |
|---|---|---|---|---|
| Style (A) | .904 | 0.904 | 11,94 | .539 |
| Group Fbdk. (B) | .937 | 0.571 | 11,94 | .848 |
| Ind. Fdbk. Patr'n. (C) | .861 | 1.375 | 11,94 | .198 |
| Ind. Fdbk. (D) | .843 | 1.595 | 11,94 | .113 |
| A x B | .848 | 1.532 | 11,94 | .133 |
| A x C | .932 | 0.622 | 11,94 | .806 |
| A x D | .914 | 0.802 | 11,94 | .637 |
| B x C | .875 | 1.215 | 11,94 | .287 |
| B x D | .885 | 1.107 | 11,94 | .365 |
| C x D | .872 | 1.250 | 11,94 | .266 |
| A x B x C | .879 | 1.180 | 11,94 | .316 |
| A x B x D | .888 | 1.075 | 11,94 | .390 |
| A x C x D | .924 | 0.700 | 11,94 | .735 |
| B x C x D | .797 | 2.170 | 11,94 | .022 |
| A x B x C x D | .779 | 2.430 | 11,94 | .010 |

C. Model C

| Source | Wilks Lambda | Approx. F | dF | sig'N |
|---|---|---|---|---|
| Style (A) | .962 | 0.972 | 11,272 | .472 |
| Group Fdbk. (B) | .877 | 1.670 | 22,544 | .029 |
| Ind. Fdbk. (C) | .884 | 1.574 | 22,544 | .047 |
| A x B | .873 | 1.742 | 22,544 | .020 |
| A x C | .908 | 1.223 | 22,544 | .221 |
| B x C | .880 | 0.803 | 44,1042.5 | .818 |
| A x B x C | .867 | 0.903 | 44,1042.5 | .653 |

Figure I - 1: A DECISION MAKING MODEL OF INDIVIDUAL ADOPTION AND PERSISTENCE

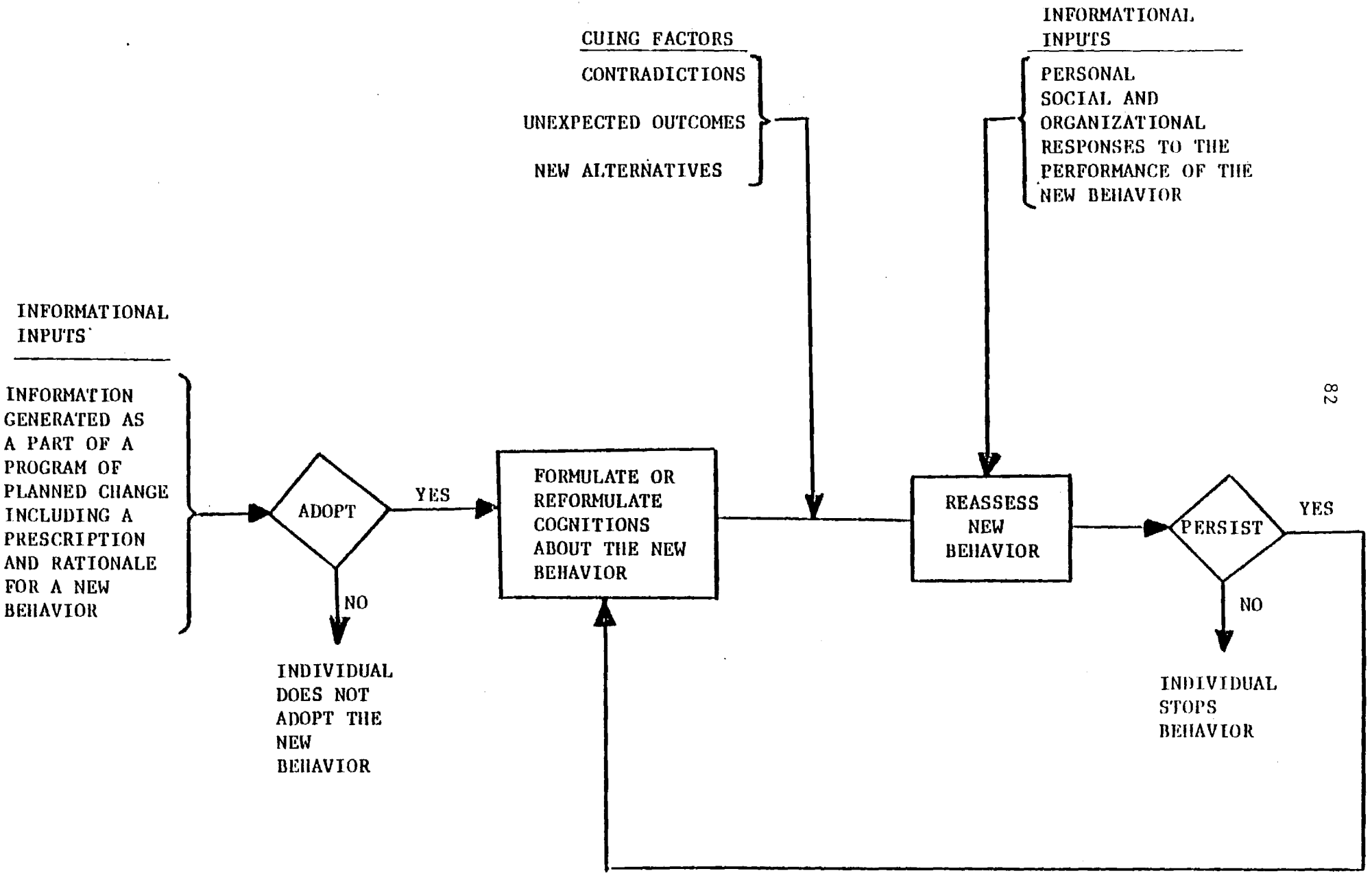


Figure III - 1

Laboratory Layout

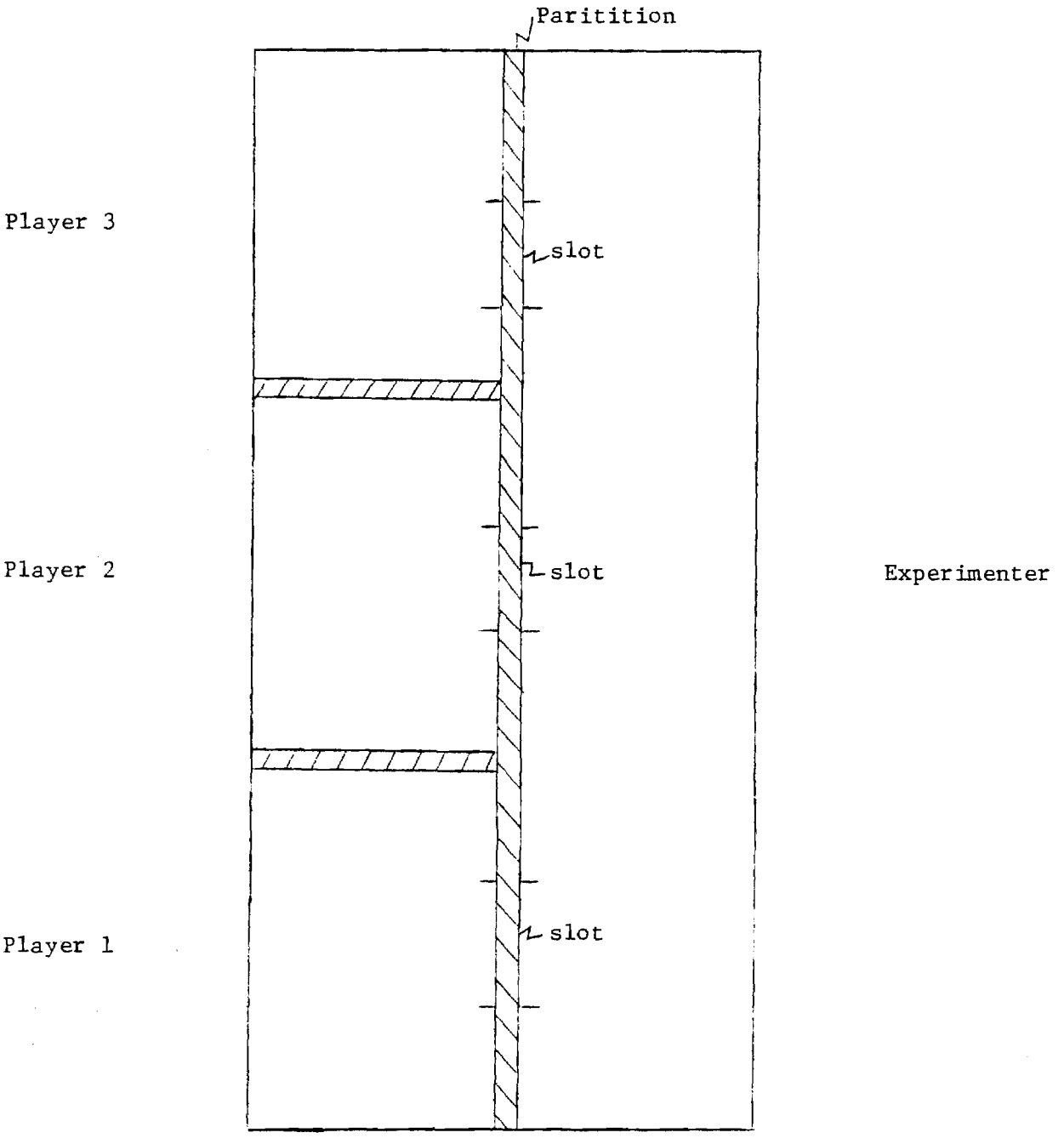


Figure III - 2

Form Used to Provide Feedback

Individual
Feedback Form

Team # _____

Decision # _____

| Product | % difference from optimal sales | Relationship to * other groups |
|---|---|---|
| Coffee | _____% | _____ |
| Mr. Cookie | _____% | _____ |
| Vichyssoise | _____% | _____ |

* + means above the average performance of other decision makers for the product given the same market conditions.

\- means below the average performance of other decision makers for the product given the same market conditions.

Group Feedback
Form

Team # _____

Decision # _____

% difference from maximum profit for the group on this decision: _____%

Relationship to performance of other groups: _____*

* + means above average performance compared to the performance of other teams given the same market conditions.

\- means below average performance compared to the performance of other teams given the same market conditions.

Figure III - 3

A Schematic of the Experimental Design

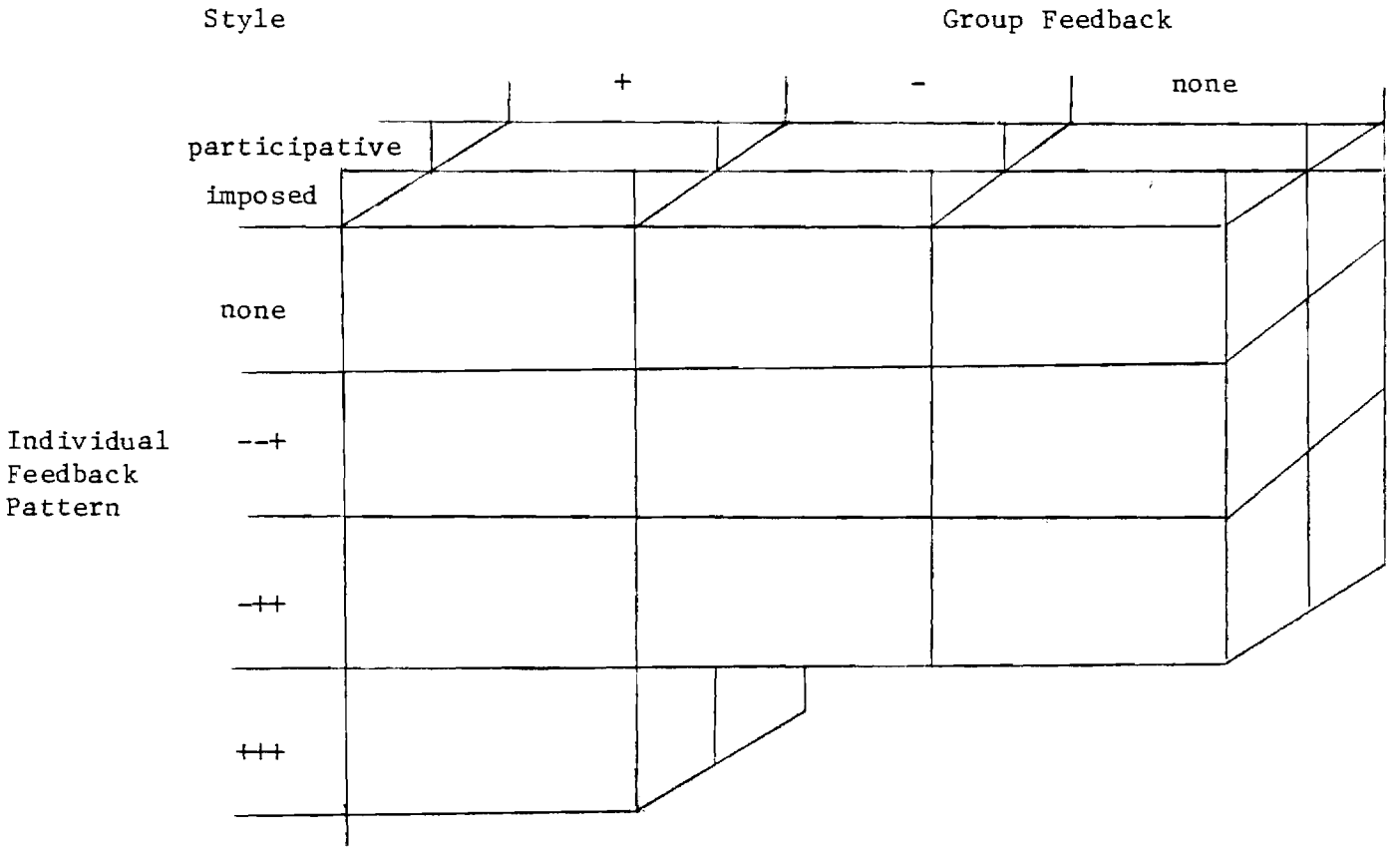


Figure IV - 1

Outline of the Cell Means for Item Re6
(Accuracy of Feedback)

Note: High Score Denotes Less Accuracy

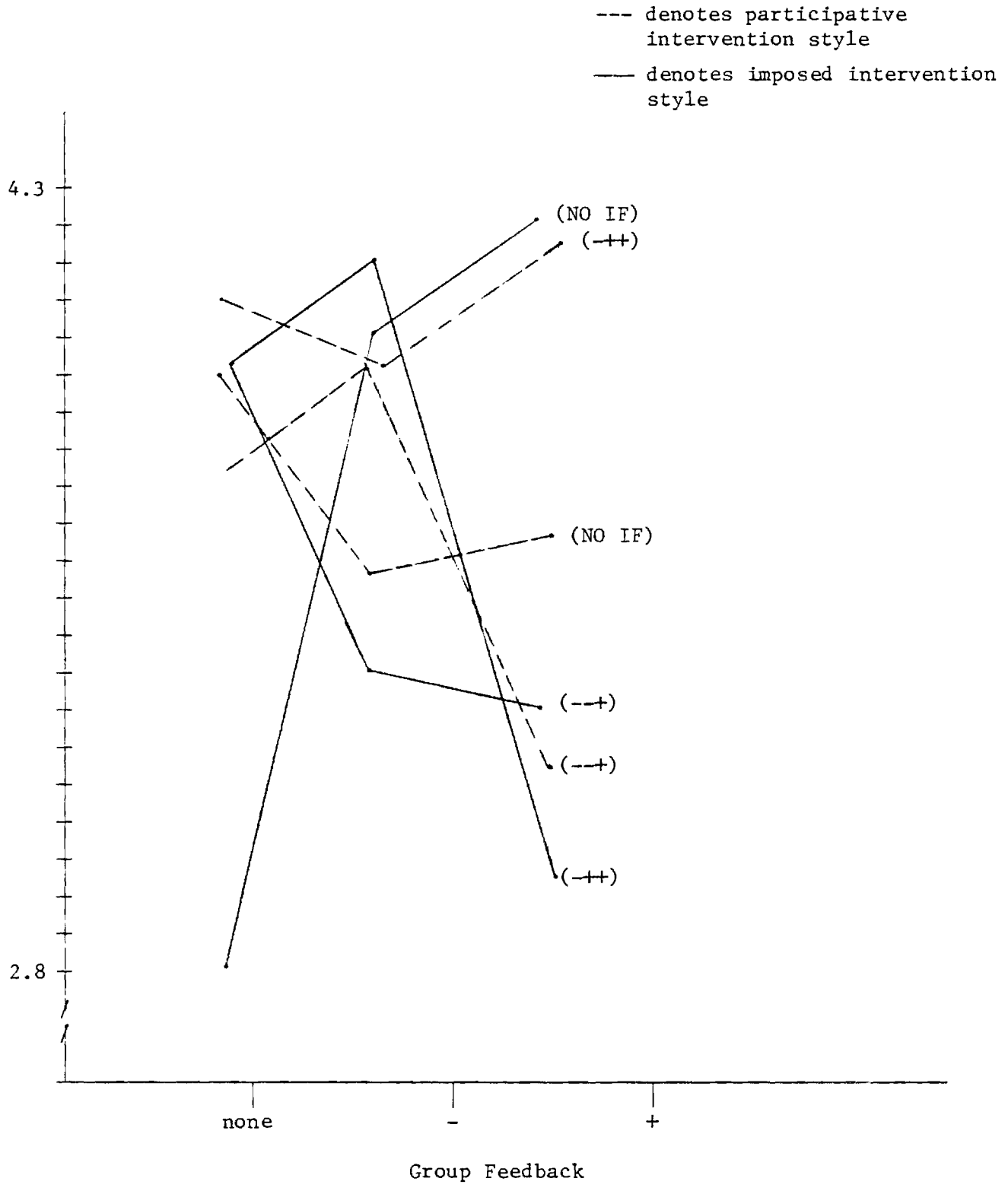


Figure IV - 2

Condition Means for Behavior Intention
(Model C)

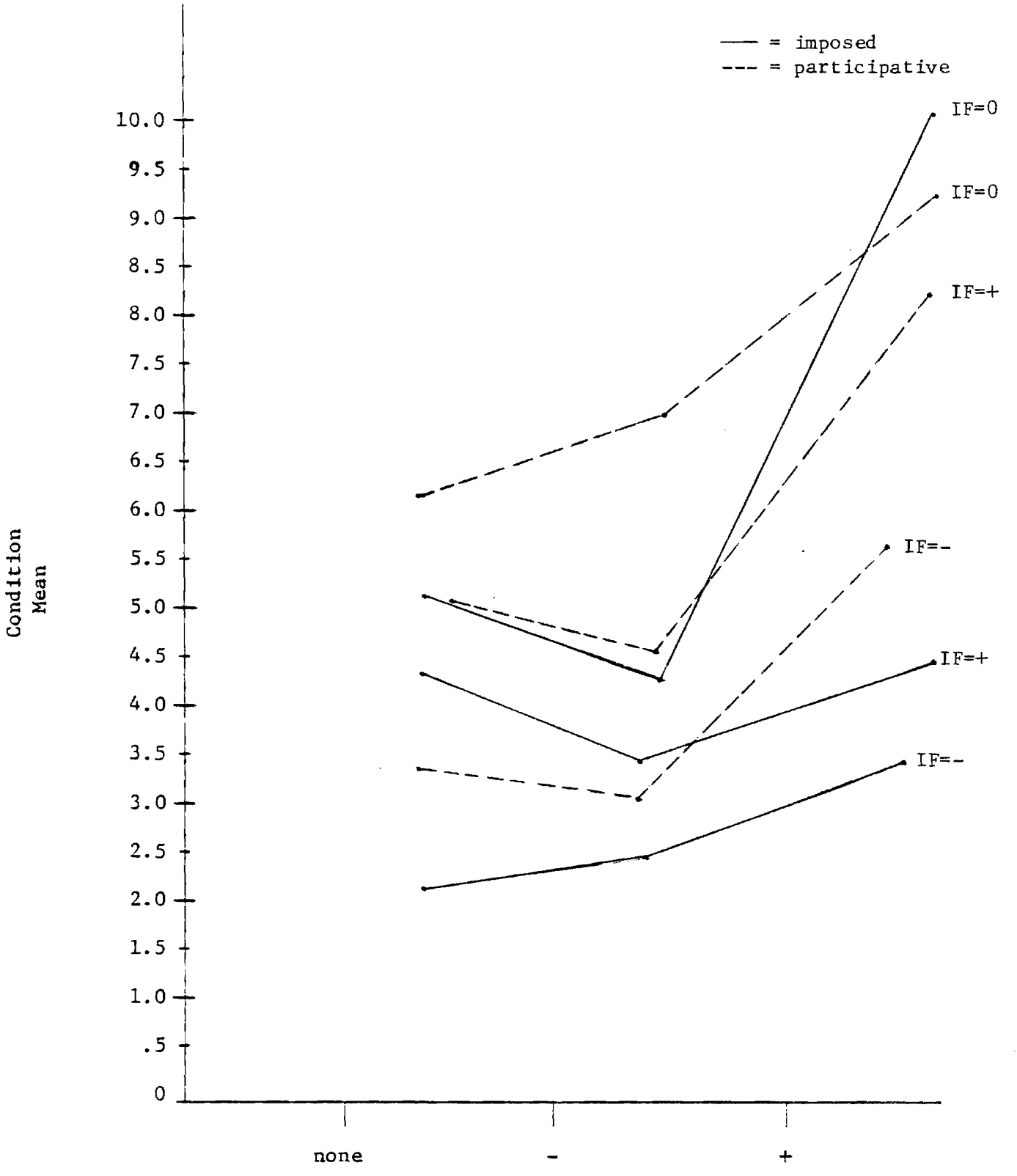


Figure IV - 3

Diagram of Style x Group Feedback Interaction
on Item Ral6 (Model A)

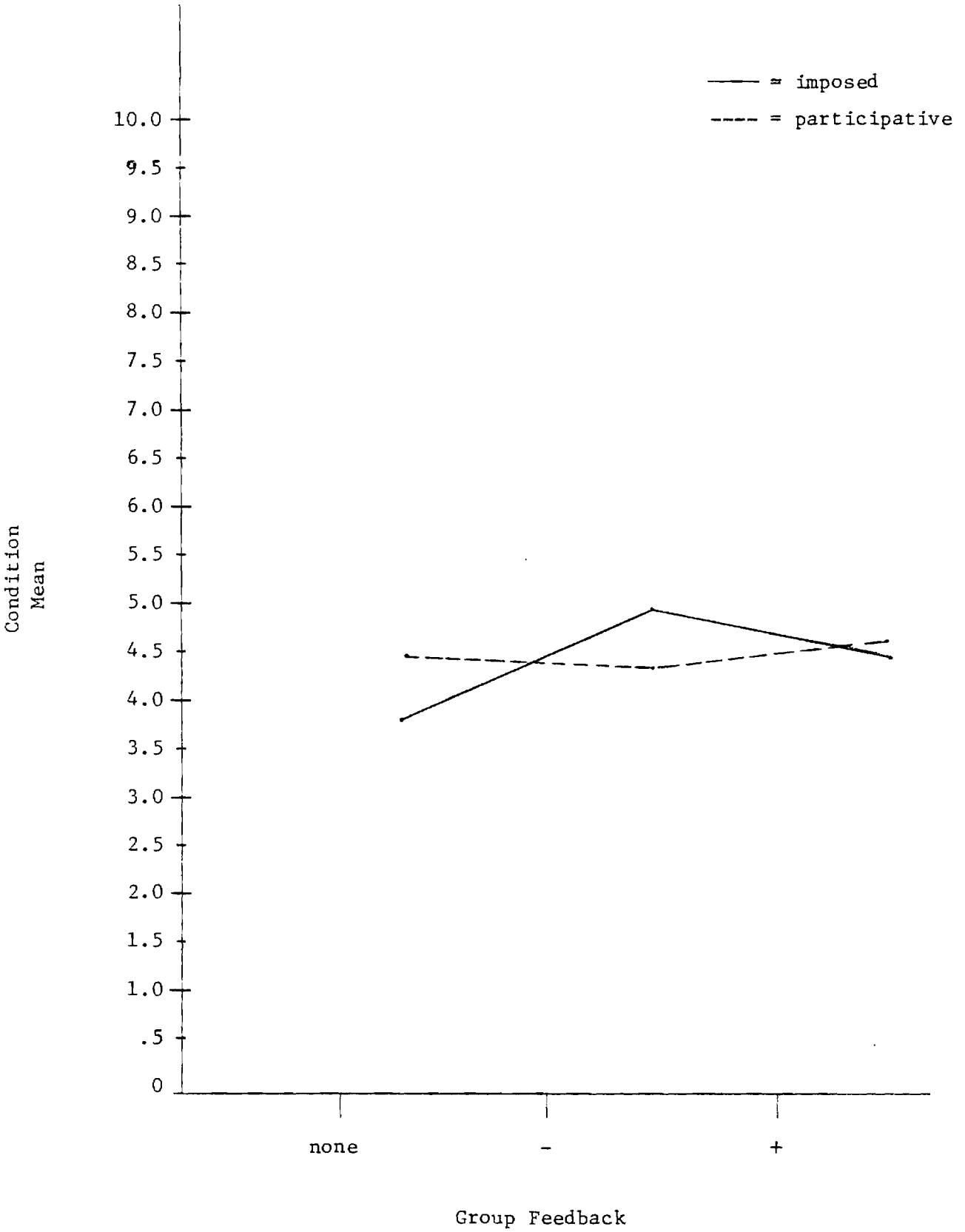
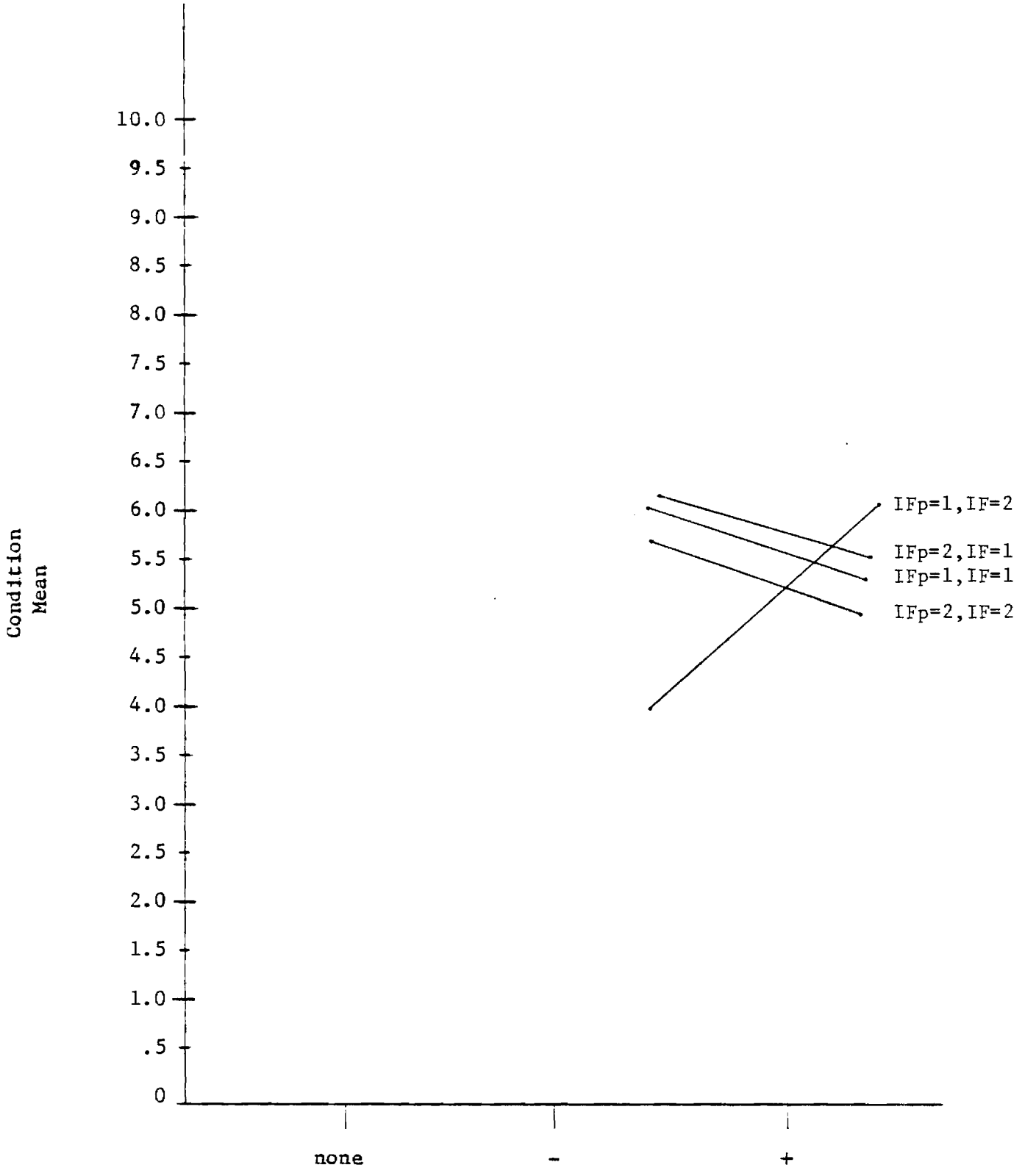


Figure IV - 4

Cohesiveness
Model B - Means
(Item 20)



# Appendix 1

## Instructions for Playing the Game

## THE MANAGEMENT SIMULATION RESEARCH PROJECT

The study in which you will participate today is part of a larger program of research being conducted on managerial simulations as educational tools. As you may know these simulations, often called "management games," require that participants act as managers of make-believe organizations and make decisions which ultimately affect the organization's effectiveness. In this way, participants are expected to gain insights into the process of making day-to-day managerial decisions through the actual experience of making them.

Today, you will be assigned to a team that will play a management game. We hope that you will find that playing the game is challenging and informative, and that you will try hard to do your best. At various times we will ask you a variety of questions that evaluate aspects of the game. Please do your best to convey your honest beliefs and feelings through your responses to these questions. Thank you, in advance, for your enthusiastic participation.

# THE DOWNTOWN DELI GAME

Downtown Deli's Inc. is a chain of delicatessens specializing in operating high quality sandwich shops in the downtown convention and entertainment districts of eight major North American cities. The mode of organization used by the chain is to develop district management teams who oversee advertising, pricing, ordering, hiring and several other operations for all Downtown Deli's in the district. Your team is in charge of three product lines for the three stores in Toronto, Canada.

An important marketing concept for Downtown's Deli's Inc. is that many items are guaranteed to be prepared fresh daily and at the end of the day are discarded if not sold. Among these are breads, soups, ground coffee and juice drinks, salads, desserts and cooked fish. An important variable affecting profitability, then, is the discrepancy between the amount prepared of those products and <u>what is</u> or <u>could be</u> sold. Over-preparation means losses due to waste whereas under-preparation means losses in opportunity costs. Since the mark-up on all items is 100% of cost, the per-item losses due to over- and under-ordering are equivalent. This game involves the ability of your team to manage three "fresh daily" product lines.

The three product lines are beverages, desserts, and soups, and, for simplicity's sake, each line contains one item. All of these items are prepared, overnight, in the Toronto kitchen of Downtown Deli's and distributed to the three local retail outlets. Your task is to order the appropriate amount to be delivered to the shops by 3 o'clock on the day prior to delivery. The relative amount delivered to each shop is constant, so you need only specify the total quantity to be delivered to all three shops combined.

Each member of your team is responsible for one product line. The beverage manager handles fresh ground coffee. The dessert line includes "Mr. Cookie" -- a large raisin and oatmeal cookie. The soups line contains vichyssoise -- a cold soup containing onions and potatoes in a creamy chicken stock. Each of you will be provided with an order sheet for the products, and a sheet providing some data about the next day's market conditions. The potential sales for each product are significantly related to these data. In addition, there are various interdependencies among product lines. For example, beverages may be ordered only when food products are available, or vice versa. Underordering of one product may either curtail or enhance sales of other products. For that reason, it may be helpful for you to keep track of the ordering of each product. Your task is to place an order for your product by 3:00 p.m. of the day prior to delivery.

## Playing the Downtown Deli Game

You and the other members of your team must manage three of the famous "fresh-daily" products. Your job is to make ordering decisions so that the amount of a product ordered is as close as possible to the amount actually sold. When games of this type are played as course requirements, grades are usually based on a combination of individual and team performance at the decision making task. Individual performance in this game is how close you come to ordering the correct amount of your product. Team performance is the overall profitability of your team. In lieu of grades, bonus money is available for individuals and teams who perform well. This bonus will depend both on individual and team performance and will be administered by the moderator of the game.

The game is played as follows. Each player on your team will be provided with an information sheet for the following business day. You will be allowed a maximum of 2 minutes to make an ordering decision of your particular product. During this time, no discussion or other communication among team members is permitted (often, real managers do not have an opportunity to consult prior to decision making). After each of you has submitted his/her decision form, you will be provided with a planning and discussion period until the next information sheet is provided.

The information sheet contains the following kinds of information:

(1) Weather factors - this includes the forecasted temperature and probability of precipitation for the following day.

(2) Concert hall - there is a 6,500 seat concert hall in the downtown area that is within 5 blocks of two of the stores. Information is presented about the type of act appearing there.

(3) Convention - Toronto is an important convention city. An average of 1,000 hotel rooms in the downtown area are reserved for each convention. Data are presented about the convention that is currently in town.

(4) Day of the week - what day (Sun - Sat) of the week the next day is.

You can expect the sales of all items to vary according to these conditions. To a large extent, sales depend on the number of people downtown on a particular day. Your stores are open from 11:00 a.m. to 1:00 a.m. Your patrons include business people, shoppers, conventioneers, show audiences and general "downtowners." The shopping stores, in Toronto, are open until 10:00 p.m. on Friday and Saturday nights and close at 5:30 p.m. all other nights. A second consideration, besides sheer numbers, are consumer tastes. For example, the eating habits of a rock music audience are somewhat different than those of a classical music audience. Also, weather affects eating habits. Your task, then, is to figure out how a particular profile of weather and patrons affects demand for each of your products. You may expect the relationships between the information and sales to be constant over time.

As noted earlier, the relationship between sales and profitability is the same for overordering as underordering because price is always set at 100% of cost. The costs for these products varies over time as prices for ingredients change. Hence the relative profit obtained from the sale of an item may change slightly from period to period. Generally, the relative profitability of a bulk

unit for each of the products is about the same with deviations of not more than 10-20%. An historical sales range for each product is provided on the following page.

## Product Sales Data

| Product | Servings/Bulk Unit | Historical Bulk Unit Sales Range Min | Max |
|---|---|---|---|
| Coffee | 10/package | 18 pkg | - 1000 pkg |
| Mr. Cookie | 12/dozen | 22 doz | - 650 doz |
| Vichyssoise | 5/quart | 15 qt. | - 600 qt. |

## Appendix 2

Order Forms

Order Forms

Name:_____ Team #: _____

Decision #: _____

Manager's Order Form

Manager of: (Check one)

Beverages _____

Desserts _____

Soups _____

Place order for your product

Coffee _____ packages

Mr. Cookie _____ dozen

Vichyssoise _____ quarts

## Appendix 3

Information on Which Game Decisions
were Based for Each Trial

Downtown Deli Game

Decision Information

Form

DECISION # 1

WEATHER FORECAST FOR TOMORROW

Temperature: High 40 ° f

Low 15 ° f

Average 25 ° f

Chance of precipitation: 40 %

Day of the Week (Tomorrow): SAT.

CONCERT HALL DATA

Appearing: 1:00 PM, CALIFORNIA SUITE (a comedy)

8:00 PM, CALIFORNIA SUITE (a comedy)

CONVENTION DATA

NONE

Downtown Deli Game

Decision Information

Form

DECISION # 2

WEATHER FORECAST FOR TOMORROW

Temperature: High 52 ° f

Low 28 ° f

Average 40 ° f

Chance of precipitation: 20 %

Day of the Week (Tomorrow): SUN.

CONCERT HALL DATA

Appearing: 1:00 PM, None

8:00 PM, None

CONVENTION DATA

None

1

Downtown Deli Game

Decision Information

Form

DECISION # 3

WEATHER FORECAST FOR TOMORROW

Temperature: High 80 ° f

Low 52 ° f

Average 66 ° f

Chance of precipitation: 10 %

Day of the Week (Tomorrow): SAT.

CONCERT HALL DATA

Appearing: 1:00 PM, ALLEN BRADLEY'S PUPPETS

8:00 PM, _____

CONVENTION DATA

CONSUMER ADVOCATES OF AMERICA

_____

_____

_____

Downtown Deli Game

Decision Information

Form

DECISION # 4

WEATHER FORECAST FOR TOMORROW

Temperature: High 82 ° f

Low 73 ° f

Average 78 ° f

Chance of precipitation: 80 %

Day of the Week (Tomorrow): Wed

CONCERT HALL DATA

Appearing: 1:00 PM, NONE

8:00 PM, Mc BETH

CONVENTION DATA

NONE

Downtown Deli Game

Decision Information

Form

DECISION # 5

WEATHER FORECAST FOR TOMORROW

Temperature: High 36 ° f

Low 14 ° f

Average 25 ° f

Chance of precipitation: 50 %

Day of the Week (Tomorrow): Wed.

CONCERT HALL DATA

Appearing: 1:00 PM, None

8:00 PM, None

CONVENTION DATA

Canadian Institute of Pediatrics

_____

_____

_____

Downtown Deli Game

Decision Information

Form

DECISION # 6

WEATHER FORECAST FOR TOMORROW

Temperature: High 45 ° f

Low 39 ° f

Average 43 ° f

Chance of precipitation: 90 %

Day of the Week (Tomorrow): FRI

CONCERT HALL DATA

Appearing: 1:00 PM, None

8:00 PM, CANADIAN NATIONAL SYMPHONY

CONVENTION DATA

CANADIAN BOARD OF REALTORS

Downtown Deli Game

Decision Information

Form

DECISION # 7

WEATHER FORECAST FOR TOMORROW

Temperature: High 62 ° f

Low 48 ° f

Average 55 ° f

Chance of precipitation: 20 %

Day of the Week (Tomorrow): SAT.

CONCERT HALL DATA

Appearing: 1:00 PM, PETER AND THE WOLF (CHILDREN'S THEATER)

8:00 PM, NONE

CONVENTION DATA

NONE

Downtown Deli Game

Decision Information

Form

DECISION # 8

WEATHER FORECAST FOR TOMORROW

Temperature: High 26 ° f

Low 10 ° f

Average 18 ° f

Chance of precipitation: 20 %

Day of the Week (Tomorrow): Tues

CONCERT HALL DATA

Appearing: 1:00 PM, None

8:00 PM, Toronto Players - Romeo & Juliet

CONVENTION DATA

Plumber's & Steamfitter's Union

Downtown Deli Game

Decision Information

Form

DECISION # 9

WEATHER FORECAST FOR TOMORROW

Temperature: High 90 ° f

Low 60 ° f

Average 75 ° f

Chance of precipitation: 50 %

Day of the Week (Tomorrow): SAT.

CONCERT HALL DATA

Appearing: 1:00 PM, None

8:00 PM, Electric Light Orchestra

CONVENTION DATA

None

Downtown Deli Game

Decision Information

Form

DECISION # 10

WEATHER FORECAST FOR TOMORROW

Temperature: High 85 ° f

Low 70 ° f

Average 77 ° f

Chance of precipitation: 0 %

Day of the Week (Tomorrow): THURSDAY

CONCERT HALL DATA

Appearing: 1:00 PM, NONE

8:00 PM, CHICAGO

CONVENTION DATA

ONTARIO SOCIETY OF NURSING

Downtown Deli Game

Decision Information

Form

DECISION # 11

WEATHER FORECAST FOR TOMORROW

Temperature: High 66 ° f

Low 30 ° f

Average 48 ° f

Chance of precipitation: 60 %

Day of the Week (Tomorrow): MON.

CONCERT HALL DATA

Appearing: 1:00 PM, NONE

8:00 PM, PIPPIN (A MUSICAL)

CONVENTION DATA

PARENTS WITHOUT PARTNERS

Downtown Deli Game

Decision Information

Form

DECISION # 12

WEATHER FORECAST FOR TOMORROW

Temperature: High 22 ° f

Low 0 ° f

Average 11 ° f

Chance of precipitation: 20 %

Day of the Week (Tomorrow): THURS.

CONCERT HALL DATA

Appearing: 1:00 PM, NONE

8:00 PM, EARTH, WIND & FIRE (ROCK)

CONVENTION DATA

ASSOCIATION OF CANADIAN LAW ENFORCERS

_____

_____

_____

Downtown Deli Game

Decision Information

Form

DECISION # 13

WEATHER FORECAST FOR TOMORROW

Temperature: High 54 ° f

Low 36 ° f

Average 45 ° f

Chance of precipitation: 50 %

Day of the Week (Tomorrow): SAT.

CONCERT HALL DATA

Appearing: 1:00 PM, The Little Prince (Children)

8:00 PM, None

CONVENTION DATA

Society For Cardiovascular Research (Doctors)

Downtown Deli Game

Decision Information

Form

DECISION # 14

WEATHER FORECAST FOR TOMORROW

Temperature: High 28 ° f

Low 16 ° f

Average 22 ° f

Chance of precipitation: 100 %

Day of the Week (Tomorrow): Wed

CONCERT HALL DATA

Appearing: 1:00 PM, None

8:00 PM, None

CONVENTION DATA

Girl Scouts of America (Scouts & leaders)

Downtown Deli Game

Decision Information

Form

DECISION # 15

WEATHER FORECAST FOR TOMORROW

Temperature: High 90 ° f

Low 60 ° f

Average 75 ° f

Chance of precipitation: 10 %

Day of the Week (Tomorrow): Wed.

CONCERT HALL DATA

Appearing: 1:00 PM, None

8:00 PM, None

CONVENTION DATA

None

Downtown Deli Game

Decision Information

Form

DECISION # 16

WEATHER FORECAST FOR TOMORROW

Temperature: High 55° f

Low 41° f

Average 48° f

Chance of precipitation: 60 %

Day of the Week (Tomorrow): SUN

CONCERT HALL DATA

Appearing: 1:00 PM, HAMLET - The Royal Shakespeare Co.

8:00 PM, None

CONVENTION DATA

None

Downtown Deli Game

Decision Information

Form

DECISION # 17

WEATHER FORECAST FOR TOMORROW

Temperature: High 85 ° f

Low 71 ° f

Average 78 ° f

Chance of precipitation: 80%

Day of the Week (Tomorrow): Tues

CONCERT HALL DATA

Appearing: 1:00 PM, NONE

8:00 PM, NONE

CONVENTION DATA

CANADIAN TOUR GUIDE ASS'N

Downtown Deli Game

Decision Information

Form

DECISION # 18

WEATHER FORECAST FOR TOMORROW

Temperature: High 72 ° f

Low 40 ° f

Average 56 ° f

Chance of precipitation: 15 %

Day of the Week (Tomorrow): Friday

CONCERT HALL DATA

Appearing: 1:00 PM, Little Women

8:00 PM, Little Women

CONVENTION DATA

The Econometric Society (Economists)

Downtown Deli Game

Decision Information

Form

DECISION # 19

WEATHER FORECAST FOR TOMORROW

Temperature: High 29 ° f

Low 15 ° f

Average 22 ° f

Chance of precipitation: 60 %

Day of the Week (Tomorrow): MONDAY

CONCERT HALL DATA

Appearing: 1:00 PM, THE NUTCRACKER SUITE (A BALLET)

8:00 PM, NONE

CONVENTION DATA

NONE

NONE

Downtown Deli Game

Decision Information

Form

DECISION # 20

WEATHER FORECAST FOR TOMORROW

Temperature: High 84 ° f

Low 68 ° f

Average 76 ° f

Chance of precipitation: 90 %

Day of the Week (Tomorrow): SAT

CONCERT HALL DATA

Appearing: 1:00 PM, NONE

8:00 PM, THE EAGLES (ROCK)

CONVENTION DATA

CANADIAN SOCIETY OF LAW PROFESSORS

Downtown Deli Game

Decision Information

Form

DECISION # 21

WEATHER FORECAST FOR TOMORROW

Temperature: High 50 ° f

Low 22 ° f

Average 36 ° f

Chance of precipitation: 80 %

Day of the Week (Tomorrow): MON

CONCERT HALL DATA

Appearing: 1:00 PM, NONE

8:00 PM, NONE

CONVENTION DATA

NONE

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